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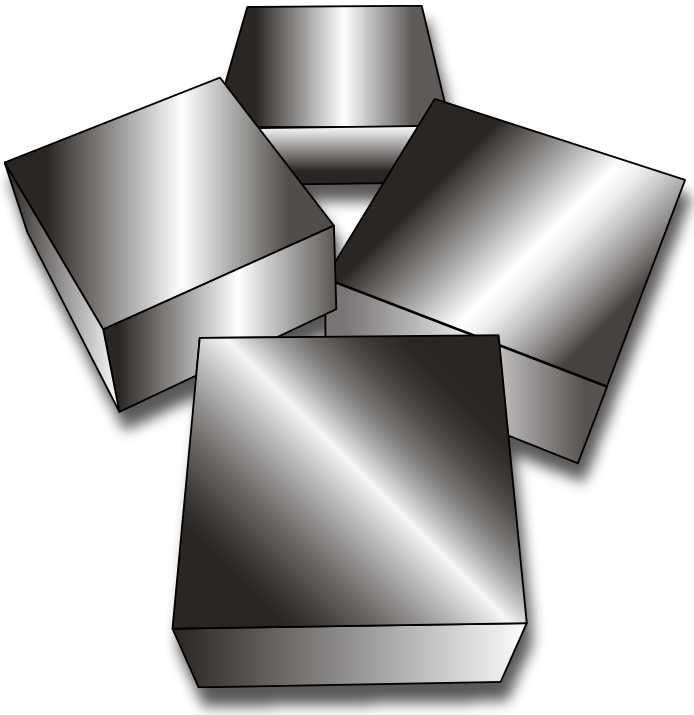
FY 2003 ANNUAL REPORT

U.S. ARMY ENVIRONMENTAL CENTER

ACQUISITION AND TECHNOLOGY DIVISION



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This report summarizes projects carried out during Fiscal Year 2003 by the US Army Environmental Center's Acquisition and Technology Division. The report describes each project's participants, results, requirements, milestones and products. The Acquisition and Technology Division provides support to Headquarters, Department of the Army (HQDA), Major Army Commands (MACOMS), Installation Management Agency (IMA), and the installations on the implementation and maintenance of environmental initiatives; provide technical expertise and guidance on regulatory issues; ensure all weapons systems programs comply with Environmental, Safety, and Occupational Health Requirements; and conduct demonstrations of new and innovative environmental technologies and transfer successful technologies to the field.

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INTRODUCTION

This report describes current projects at the U.S. Army Environmental Center (USAEC) Acquisition and Technology Division (ATD) during fiscal year (FY) 2003. These summaries will help readers to better understand the division's efforts and capabilities. Technology is a major weapon in the Army's efforts both to defend the nation and to sustain its environment. Through the programs described in this report, USAEC gives the Army access to the most effective and affordable environmental tools available.

ATD focuses on conservation, compliance, and cleanup technologies, bolstering the USAEC commitment to saving money and quickly putting innovative ideas to work for its Army and Defense Department customers.

WHAT'S INSIDE?

The FY 2003 ATD Annual Report is organized by the following categories:

- Acquisition Program
- Technology Implementation Program
- Cleanup Technologies
- Pollution Prevention/Compliance Technologies
- Technology Transfer
- Sustainable Range Technologies
- Appendices

Project descriptions are organized into several sections:

PURPOSE …What problem does the project address?

BENEFITS…How does the project help its users?

TECHNOLOGY USERS …Who will use the technology?

DESCRIPTION …Why was this technology developed? How does it work?
…What results have been achieved so far?

LIMITATIONS …What might affect use of this technology?

ACCOMPLISHMENTS AND RESULTS …What additional requirements are anticipated?

PROGRAM PARTNERS …What organizations are participating in the project? (Appendix B contains a consolidated list of partners.)

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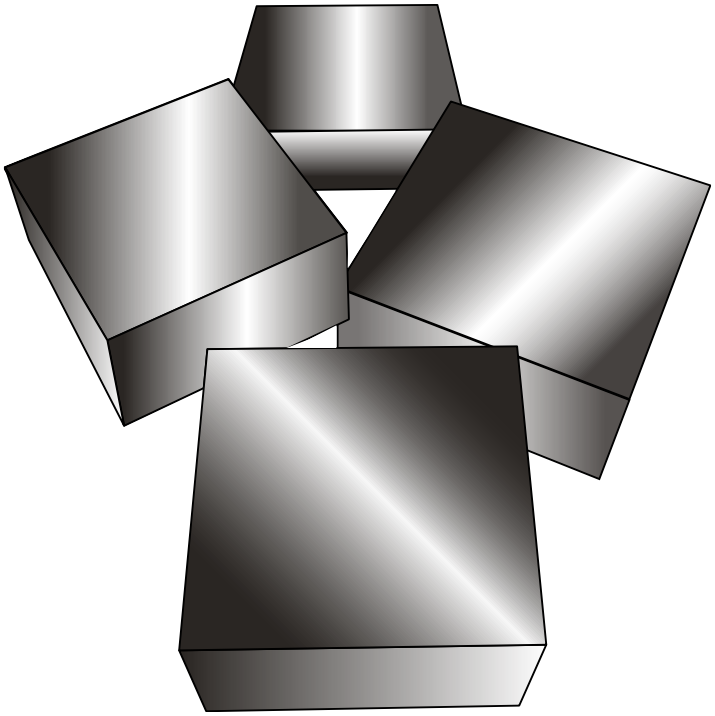
AQUISITION PROGRAM



ENVIRONMENTAL QUALITY LIFE CYCLE COST ESTIMATE (EQLCCE)

PURPOSE

In response to the 1995 Defense Appropriations Act requirements, which requires the Program Manager's Office (PMO) to generate an EQLCCE, the Department of Defense (DoD) and the Services were interested in developing methodologies and databases for the analysis of environmental costs of major defense acquisitions. Responsibility for performing environmental costs analysis of Major Defense Acquisition Programs (MDAPs) in the Army is borne by the responsible PMO, Office of the Deputy Assistant Secretary of the Army for Cost & Economics (ODASA-CE), and various DoD agencies. PMs who acquire, fund, produce, and maintain weapon systems must, in accordance with DoD 5000.2-R, determine environmental costs and impacts of weapon systems from conception through disposal.

Because of rising concerns about hidden environmental costs associated with Army weapon systems, a number of studies, including audits performed by the DoD Inspector General (IG) and the Army Audit Agency (AAA), have examined the Environmental, Safety and Health (ESH) aspects of weapon systems acquisition. An Office of the Assistant Secretary of the Army for Installations, Logistics and Environment (OASA (ILE)) briefing to OASA Research, Development and Acquisition (RDA) on 9 September 1997 stated that over 75 percent of all Army pollution is caused directly or indirectly by weapon systems. Approximately 1.8 percent of the Army's Total Obligation Authority is spent annually on restoration, conservation, compliance, and pollution prevention.
Consequently, every effort should be made to reduce the various costs when possible.

BENEFITS

The most significant benefits of performing an EQLCCE for a weapon system are:

- **Improving the visibility of proven and potential environmental impacts and costs of the weapon system**
- **Providing opportunities for the Program Manager (PM), developer and fielding installations to identify and reduce environmental costs and determine alternatives associated with the weapon system**
- **Reducing the potential risk of remediation/restoration of environmental impacts with potential cost savings to the Army**
- **Providing an independent cost estimate acceptable to ODASA-CE for validation**
- **Assisting the PM in defining compliance issues with federal environmental regulations and DoD acquisition requirements**

TECHNOLOGY USERS

PEOs, PMs, other acquisition officials, and the Office of the Deputy Assistant Secretary of the Army for Cost & Economics (ODASA-CE).

DESCRIPTION

The EQLCCE identifies and quantifies environmental costs over the entire life cycle for a weapon system. The EQLCCE is prepared in accordance with the latest version of the ODASA-CE's Cost Analysis Manual (CAM). The EQLCCE information can be used to identify areas of improvement such as material substitution, process changes, and/or recycling, and potentially reduce the overall cost of the weapon system. An environmental Work Breakdown Structure (WBS) format is used to compile individual environmental cost elements and total costs for the entire program. The WBS includes all weapon system cost elements associated with environmental and regulatory compliance.

ACCOMPLISHMENTS AND RESULTS

The U.S. Army Environmental Center (USAEC) has completed many EQLCCEs for different types of weapon systems. The USAEC continues to develop environmental costing information on weapon systems. This effort will greatly improve environmental costing for weapon system PMs.

The USAEC has completed the following EQLCCEs for each type of weapon system:

- **Aviation Systems - CH-47F Chinook, Tactical Unmanned Aerial Vehicle, and UH-60 Blackhawk**
- **Ground Combat Systems - Bradley M2A3 Infantry Fighting Vehicle, Excalibur, and Stryker**
- **Electronic/Automated Software/Communication Systems – Joint Tactical Radio System, Warfighter Information Network – Tactical Joint Simulation System, Joint Land Elevated Netted Sensor, Adv. Threat Infrared Countermeasure Common Missile Warning System, Global Combat Support System, and Aerial Common Sensor**
- **Artillery/Missile Systems – Tactical High Energy Laser, Patriot Advanced Capability – 3, Guided Multiple Launch Rocket System, High Mobility Artillery Rocket System, Army Tactical Missile System – Brilliant Anti-Armor Submunition, and Multiple Launch Rocket System**
- **Soldier Support Systems – Land Warrior**

The USAEC plans on developing EQLCCEs for these types of weapon systems in the future:

- **Future Combat System**
- **Ground Tactical Systems**
- **Engineer/Construction Systems**
- **Individual and Crew-Served Ground Weapon Systems**
- **Combat Support/ Combat Service Support System**
- **Distributed Common Ground Station-Arms**
- **Joint Common Missile**

PROGRAM PARTNERS

U.S. Army Environmental Center
Office of the Deputy Assistant Secretary of the Army for Cost and Economics
Various PM offices

GUIDE TO ESOH PREPARATION FOR AN ASARC REVIEW

The U.S. Army Environmental Center has completed the *Guide to ESOH Preparation for an ASARC Review* (February 2004).

PURPOSE

The document provides a methodology that uses a program's ESOH constituency to assist with ASARC ESOH preparation. It relies on a proactive approach comprised of early identification of ESOH issues of all interested parties; early definition and agreement on all substantial ESOH activities and documentation requirements; and involvement and commitment of the interested parties in the resolution of issues identified by the Programmatic Environment, Safety, and Occupational Health Evaluation (PESHE).

BENEFITS

The guide will assist Army Program Offices and their environmental support personnel in Environment, Safety and Occupational Health (ESOH) data collection and review as part of a program's preparation for an Army Systems Acquisition Review Council (ASAC) Review.

TECHNOLOGY USERS

Department of Defense (DoD) PMs and program executive officers (PEOs)

DESCRIPTION

This guide is designed to assist a Program/Project/Product Manager (PM) and his or her staff prepare for the ESOH portion of ASARC reviews. Acquisition Programs vary greatly in complexity. Consequently, a "one-size-fits-all" approach to the ESOH aspects of an ASARC review is inappropriate and may not yield satisfactory results. This guide is divided into six key chapters as follows: 1) Introduction; 2) Materiel Acquisition Life-Cycle Activities in the ASARC Process; 3) Summary of ESOH Requirements; 4) A Methodology for ESOH Preparation; 5) ASARC Review Process, and 6) ASARC ESOH Questions. The guide is a living document that is modified as necessary, to incorporate changes in federal legislation, Executive Orders, and Department of Defense (DoD) and Army policy and guidance. Users are advised to periodically visit the USAEC acquisition document Web site at http://aec.army.mil/usaec/acquisition/documents00.html to ensure use of the most current version.

ACCOMPLISHMENTS AND RESULTS

The U.S. Army Environmental Center (USAEC) has published an updated edition of the *Guide to ESOH Preparation for an ASARC Review* (February 2004). It can be accessed at the following Web address: http://aec.army.mil/usaec/acquisition/asarc04.pdf.

FOLLOW-ON PROGRAM REQUIREMENTS

USAEC shall staff this guide through ASA (I&E) to ASA (ALT) for approval and posting to the ASA (ALT) digital library for dissemination and use by the Acquisition community.

PROGRAM PARTNERS

U.S. Army Environmental Center
U.S. Army Space and Missile Defense Command
Teledyne Solutions Incorporated

NEPA MANUAL FOR MATERIEL ACQUISITION

Recent government audits of selected Defense Department acquisition programs revealed that compliance with the National Environmental Policy Act (NEPA) had not been properly factored into the acquisition management process. This manual will provide information to help program managers (PMs) consider NEPA during materiel acquisition.

PURPOSE

To provide advisory information for integrating the requirements of NEPA called out in the 32 Code of Federal Regulations (CFR) Part 651 (Environmental Analysis of Army Actions; Final Rule), into the materiel acquisition process. An approved updating of AR 200-2 is anticipated in the near future.

BENEFITS

This manual will simplify the NEPA process so PMs understand when to use a Categorical Exclusion (CX) or Record of Environmental Consideration (REC), an Environmental Assessment (EA) or Environmental Impact Statement (EIS), and feel comfortable with each approach.

TECHNOLOGY USERS

Department of Defense (DoD) PMs and program executive officers (PEOs).

DESCRIPTION

NEPA requires the identification and analysis of potential environmental impacts of certain federal actions and alternatives before those actions can be initiated. The law also contains specific requirements for informing and involving other federal and state agencies and the public. NEPA requires a systematic, interdisciplinary approach to analyzing and considering environmental factors when planning or conducting federal agency programs and projects. The process for implementing the law is codified in Council on Environmental Quality Regulations, 40 Code of Federal Regulations (CFR) Parts 1500-1508.

Recent government audits revealed that NEPA compliance had not been properly factored into several DoD acquisition programs. This was likely due, in part, to the false assumption that NEPA is primarily of concern only to installation and facility engineers.

This manual will provide advisory information for integrating the requirements of NEPA and the 32 Code of Federal Regulations (CFR) Part 651 (Environmental Analysis of Army Actions; Final Rule) into the materiel acquisition process. The information will assist PEOs and PMs with the implementation of NEPA policies and procedures as they pertain to Army materiel acquisition.

There is a significant effort within DoD to reduce the number of mandatory policies, procedures, and practices for the acquisition of weapon systems and other Army materiel. This manual will offer PEOs and PMs flexibility in satisfying the goals of NEPA.

This manual is one of a set of four instructional manuals covering the integration of NEPA into Army activities. Previously published manuals cover base realignment and closure, installation operations, and on- and off-post training NEPA considerations. The manual represents a "living document" that will change as improvements to the acquisition process occur.

ACCOMPLISHMENTS AND RESULTS

- **Published *NEPA Manual for Materiel Acquisition* (November 2000).**
- **Effective 30 Oct 02, DoDD 5000.1 and DODI 5000.2 were replaced by interim guidance and DoD 5000.2-R was cancelled. The SECDEF has determined that these documents "required revision to create an acquisition policy environment that fostered efficiency, flexibility, creativity, and innovation." Replacement documents for DoD Directive 5000.1 and for DoD Instruction 5000.2 were issued on 12 May 2003.**
- **Updated the *NEPA Manual for Materiel Acquisition* in January 2004 to capture all the changes made to DoD Directive 5000.1, DoD Instruction 5000.2, latest requirements specified in the 32 Code of Federal Regulations (CFR) Part 651 (Environmental Analysis of Army Actions; Final Rule), and to address recommendations from the latest Draft of the Department of Defense Acquisition Guidebook.**
- **Posted a NEPA Manual for Materiel Acquisition Sheet (February 2004) on the USAEC web page (http://aec.army.mil/usaec/acquisition/nepa02.pdf).**
- **Posted the updated *NEPA Manual for Materiel Acquisition* (July 2004) to USAEC Web site and to ASA(ALT) digital library. (http://library.saalt.army.mil/archive/Discr/2004/Final%20NEPA%20Manual%20%28Jul%202004%29.pdf).**

PROGRAM PARTNERS

U.S. Army Environmental Center
U.S. Army Space and Missile Defense Command
Teledyne Solutions Incorporated

PROGRAMMATIC ENVIRONMENTAL, SAFETY AND HEALTH EVALUATION GUIDE

Department of Defense (DoD) Instruction 5000.2 requires that all programs, regardless of acquisition category, include a programmatic environmental, safety and occupational health (ESOH) evaluation in their acquisition strategy. The regulation does not set a format for this evaluation but requires it to describe a program/project/product manager's (PM's) strategy for meeting ESOH requirements, establishing responsibilities, and tracking progress. Developing a guide for such evaluations will help PMs plan, execute, and document actions that fulfill the ESOH requirements of DoDI 5000.2.

PURPOSE

To develop a guide for analyzing six specific ESOH areas: National Environmental Policy Act, Environmental Compliance, System Safety and Health, Hazardous Materials, Pollution Prevention, and Explosives Safety.

BENEFITS

The development of an ESOH evaluation helps ensure those actions that fulfill the ESOH requirements of DoD Instruction 5000.2 are planned, executed, and documented.

TECHNOLOGY USERS

DoD PMs and program executive officers (PEOs)

DESCRIPTION

DoDI 5000.2 requires that all programs, regardless of acquisition category, include a programmatic ESOH evaluation in their acquisition strategy. The PM must initiate the ESOH evaluation at the earliest possible time in support of a program initiation decision (usually Milestone I) and update the evaluation throughout the program's life cycle. The document is a living document and must be updated as required to address ESOH hazard tracking (identification, proposed mitigation measures, and status) and NEPA compliance status. The DoDI (Table E3.T1. Statutory Information Requirements) requires PESHE documentation at Program Initiation (for Ships), at Milestone B, at Milestone C, and for the Full-Rate Production Decision Review.

The Programmatic Environment, Safety and Occupational Health Evaluation (PESHE) Guide can assist PMs in meeting ESOH integration requirements by providing a description of techniques, practices, and processes for integrating ESOH-related activities into the systems engineering program design process. It can help to document a program's current ESOH status, establish a process for monitoring changing compliance requirements, integrate ESOH requirements into the program's acquisition strategy and other program documentation, and establish a plan of action to meet future ESOH requirements. The guide is intended to provide information that will

help make the ESOH evaluation a useful tool for PMs in carrying out their responsibilities to consider ESOH requirements and issues early in the design process and will make sure potential program "showstoppers" are identified and resolved early in the acquisition process.

ACCOMPLISHMENTS AND RESULTS

- Developed an initial PESHE guide (July 1999).
- Published October 2001 final *PESHE Guide* which incorporated information from the updated and approved DoD 5000.2-R.
- Effective 30 Oct 02, DoDD 5000.1 and DODI 5000.2 were replaced by interim guidance and DoD 5000.2-R was cancelled. The SECDEF has determined that these documents "required revision to create an acquisition policy environment that fostered efficiency, flexibility, creativity, and innovation." Replacement documents for DoD Directive 5000.1 and for DoD Instruction 5000.2 were issued on 12 May 2003.
- Updated the *PESHE Guide* in January 2004 to capture all the changes made to DoD Directive 5000.1, DoD Instruction 5000.2, latest requirements specified in the 32 Code of Federal Regulations (CFR) Part 651 (Environmental Analysis of Army Actions; Final Rule), and to address recommendations from the latest draft of the Department of Defense Acquisition Guidebook.
- Posted a PESHE Fact Sheet (February 2004) (http://aec.army.mil/usaec/acquisition/peshe02.pdf) on the USAEC Web page.
- Posted the updated *PESHE Guide* (May 04) to USAEC Web site and to ASA(ALT) digital library. (http://library.saalt.army.mil/archive/Discr/2004/Final%20PESHE%20Guide%20%28May%202004%29.pdf).

PROGRAM PARTNERS

U.S. Army Environmental Center
U.S. Army Space and Missile Defense Command
Teledyne Solutions Incorporated

GUIDE TO ENVIRONMENTAL IMPACT ANALYSIS

National Environmental Policy Act (NEPA) analyses and documents, Environmental Assessments (EAs) and Environmental Impact Statements (EISs) are commonly too cumbersome, too lengthy, and too costly. Often, there is little consistency in the level of analysis across resource areas. The U.S. Army Environmental Center (USAEC) has published an updated edition of the Guide to Environmental Impact Analysis (February 2004). This guide was developed to assist Army Program Offices and their environmental support personnel in developing adequate environmental resource area impact analysis/documentation as part of their NEPA analysis.

PURPOSE

The purpose of this document is to provide guidance, recommendations, and suggestions for producing succinct, tightly focused, issue-driven NEPA analyses that can be used to support better decisions. It contains recommendations for efficiently and effectively preparing the affected environment description and environmental consequences portions of an Army EA or EIS.

BENEFITS

By following the approach and procedures presented in this guide, NEPA preparers and analysts can reduce or eliminate many of the typical problems associated with NEPA analyses.

TECHNOLOGY USERS

Department of Defense (DoD) PMs and program executive officers (PEOs)

DESCRIPTION

This guide can be applied to all Army NEPA analyses associated with on- and off-post training activities, materiel acquisition programs, facility construction and renovation projects, and other actions supporting installation operations. The Guide is divided into four key chapters: 1) Introduction; 2) Roles and Responsibilities; 3) Environmental Impact Analysis; and 4) Sources for Assistance, Guidance, and Information. The third chapter details a five-step process for producing a focused, consistent analysis.

ACCOMPLISHMENTS AND RESULTS

The U.S. Army Environmental Center (USAEC) has published an updated edition of the Guide to Environmental Impact Analysis (February 2004). It can be accessed at the following Web address: http://aec.army.mil/usaec/acquisition/eiaguide2004.pdf. Users are advised to periodically visit the USAEC acquisition document Web site at http://aec.army.mil/usaec/acquisition/documents00.html to ensure use of the most current version.

FOLLOW-ON PROGRAM REQUIREMENTS

USAEC will staff this guide through ASA (I&E) to ASA (ALT) for approval and posting to the ASA (ALT) digital library for dissemination and use by the Acquisition community.

PROGRAM PARTNERS

U.S. Army Environmental Center
U.S. Army Space and Missile Defense Command
Teledyne Solutions Incorporated

METHODOLOGY FOR CARD ENVIRONMENTAL QUALITY INPUT

The U.S. Army Environmental Center (USAEC) prepared a Methodology for Developing Environmental Quality Requirements for Cost Analysis Requirements Description (CARD). The document was prepared for materiel acquisition program/project office personnel charged with the responsibility of documenting environmental quality activities, so that their cost can be estimated in program Life-Cycle Cost Estimates (LCCE's).

PURPOSE

The Basic CARD structure outline is presented in DoD 5000.4-M – Cost Analysis Guidance and Procedures. The CARD outline, as presented, fragments environmental quality requirement inputs in several sections and does not facilitate quantification of all requirements. The methodology prepared recommends that CARD authors develop an environmental quality appendix for the more complete identification of a program's life-cycle environmental quality requirements.

BENEFITS

DoD 5000.2-R (contained in the DoD Acquisition Deskbook as guidance information) requires that environment, safety, and occupational health (ESOH) be integrated into the systems engineering process that translates operational needs and requirements into a system solution including design, manufacturing, test and evaluation, and support processes and products. This recent guidance to environmental quality costing policy states that the cost estimate must present evidence that the environmental quality costs are adequately accounted for. In order for environmental quality costs to be adequately analyzed and included in the LCCE, all environmental quality requirements must be clearly identified in a program's CARD. This CARD methodology shall make it much easier for the PM to anticipate the environmental quality requirements that need to be included in the CARD. Chapter 6 of The Army Cost and Economic Analysis Center (CEAC) Cost Analysis Manual (CAM) shall also be used to assist the PM in preparing their EQLCCE.

TECHNOLOGY USERS

Department of Defense (DoD) PMs and program executive officers (PEOs), and DA and DoD cost analysts

DESCRIPTION

Preparation of the environmental quality appendix is simplified by guiding the author of the CARD to quantify program data in accordance with six matrices (tables). Matrices presented include:

- **Compliance**
- **Hazardous Material Management**
- **Pollution Prevention**
- **Conservation**
- **Remediation and Restoration**
- **Demilitarization and Disposal**

Authors may use the matrices as templates to aid in documenting environmental quality program data for CARD input.

ACCOMPLISHMENTS AND RESULTS

The U.S. Army Environmental Center completed the draft Methodology for Developing Environmental Quality Requirements for Cost Analysis Requirements Description (CARD) in May 2001. The USAEC forwarded their review comments on the draft Methodology for Developing Environmental Quality Requirements for Cost Analysis Requirements Description (CARD) and the final Methodology for Developing Environmental Quality Requirements for Cost Analysis Requirements Description (CARD) was published in November 2001. A Fact Sheet for the Methodology for Developing Environmental Quality Requirements for Cost Analysis Requirements Description (CARD) is included under the Acquisition tab on the USAEC Home Page.

FOLLOW-ON PROGRAM REQUIREMENTS

An update of the Methodology for Developing Environmental Quality Requirements for Cost Analysis Requirements Description (CARD) is "on hold" until the updated DoD 5000.4-M (Department of Defense Cost Analysis Guidance and Procedures) is available. Completion of the DoD 5000.4-M is anticipated in November 2004 and the update to the Methodology for Developing Environmental Quality Requirements for Cost Analysis Requirements Description (CARD) is expected to be available during the second quarter of FY05.

PROGRAM PARTNERS

U.S. Army Environmental Center
U.S Army Cost and Economic Analysis Center
U.S. Army Space and Missile Defense Command
Teledyne Solutions Incorporated

DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES DEVELOPMENT GUIDE

The Description of Proposed Action and Alternatives (DOPAA) forms the framework for conducting an environmental impact analysis in accordance with the National Environmental Policy Act (NEPA) and its implementing regulations. Comprising much of the beginning portions of any Environmental Assessment (EA) or Environmental Impact Statement (EIS), the DOPAA defines the scope of the action as well as viable or reasonable alternatives, and serves as the basis on which to predict potential impacts. Development of the DOPAA helps in early coordination with other Army offices and outside agencies and, in the case of the EIS, provides the foundation for conducting formal scoping. Most importantly for the decision maker, the DOPAA serves as the basis for understanding alternative approaches to meeting mission needs. A flawed or incomplete DOPAA can mislead or delay the NEPA analysis process and open the way for public controversy or, in rare instances, a court order stopping the action. The U.S. Army Environmental Center published an updated edition of the Description of Proposed Action and Alternatives (DOPAA) in February 2004. The guide has been updated to incorporate the latest requirements specified in the 32 Code of Federal Regulations (CFR) Part 651 (Environmental Analysis of Army Actions; Final Rule).

PURPOSE

To provide proponents, preparers, and other NEPA analysis participants with a more structured approach to creating DOPAAs that lead to more effective and defensible environmental documents (EAs and EISs).

BENEFITS

By following the approach and procedures presented in this guide, users can reduce or eliminate the typical problems often associated with NEPA analyses, such as reanalysis of a constantly changing DOPAA, project delays, and cost overruns.

TECHNOLOGY USERS

Department of Defense (DoD) PMs and program executive officers (PEOs)

DESCRIPTION

Following the introduction of the guide in Chapter 1, Chapters 2 through 4 provide comprehensive guidance and information on DOPAA development. Chapter 2 identifies key players and describes their level of involvement in the DOPAA development process; Chapter 3 describes the components of a DOPAA, recommended formats to use, and the types of information that are normally included; Chapter 4 describes a multi-step process that can be used in the development of DOPAAs for larger and more complex Army actions (e.g., research and development projects, the fielding of new weapon systems, and large training exercises), including a review of methodologies for defining the proposed action and identifying possible alternatives.

ACCOMPLISHMENTS AND RESULTS

The USAEC published the Final Guide to Development of the Description of Proposed Action and Alternatives (DOPAA) in November 2001. The U.S. Army Environmental Center published an updated fact sheet (http://aec.army.mil/usaec/acquisition/dopaa02.pdf) and an updated edition of the Description of Proposed Action and Alternatives (DOPAA) in February 2004. USAEC placed the updated edition of the Description of Proposed Action and Alternatives (DOPAA) on the USAEC Web page (http://aec.army.mil/usaec/acquisition/dopaaguide04.pdf).

FOLLOW-ON PROGRAM REQUIREMENTS

Staff the DOPAA Guide to ASA(I&E) through ASA(ALT) for approval and posting on the ASA(ALT) digital library under discretionary guidance for use by the Acquisition community.

PROGRAM VPARTNERS

U.S. Army Environmental Center
U.S. Army Space and Missile Defense Command
Teledyne Solutions Incorporated

ESOH COMPLIANCE GUIDE FOR ARMY WEAPON SYSTEMS

The U.S. Army Environmental Center (USAEC) has published an updated edition of the Guide to Environmental, Safety, and Occupational Health (ESOH) Compliance for Army Weapon Systems (February 2004). This guide was developed to assist Army Program Offices and their environmental support personnel in maintaining program ESOH compliance throughout the life of each system. This guide is a living document that is modified, as necessary, to incorporate changes in Federal Legislation, Executive Orders, and DoD and Army policy and guidance. Users are advised to periodically visit the U.S. Army Environmental Center (USAEC) acquisition Web site at http://aec.army.mil/usaec/acquisition and then click on documents to determine if a more current version exists. A fact sheet for the Guide to Environmental, Safety, and Occupational Health (ESOH) Compliance for Army Weapon Systems can be accessed at http://aec.army.mil/usaec/acquisition/esoh02.pdf.

PURPOSE

The guide is intended to provide information that will help clarify ESOH compliance for Program/Project/Product Managers in carrying out their responsibilities to consider ESOH requirements and issues early in the design process and throughout the program life cycle.

BENEFITS

By providing increased awareness and understanding of ESOH requirements, this guide will assist PMs, and their staff, to maintain regulatory compliance throughout the acquisition life cycle and reduce the chance of program delays and cost overruns. It will also assist the PM in completing the Environmental Compliance portion of their PESHE Guide.

TECHNOLOGY USERS

Department of Defense (DoD) PMs and program executive officers (PEOs)

DESCRIPTION

Environmental requirements contained in statutes, standards, regulations, and executive orders require compliance and constitute an external constraint beyond the Program/Project/Product Manager's (PM's) control. The recent update to DoD Regulation 5000.2-R (contained in the DoD Acquisition Deskbook as guidance information) specifies that the PM "shall ensure a system design that can be tested, operated, maintained, repaired, and disposed of in accordance with ESOH statutes, regulations, and policies…"

ESOH requirements and constraints must be identified and communicated to all program activities from concept to disposal, in the same manner as any other system requirement. A weapon system design cannot be considered successful if ESOH requirements are not integrated into its overall life cycle. Often, ESOH requirements prescribe what must be done and how to do it. Examples include prohibitions on the use of ozone depleting chemicals (ODCs), consultation requirements where endangered species or historic properties may be affected, requirements relating to the management and disposal of hazardous materials and wastes, and air and water permitting requirements. These requirements can be costly to comply with early in a program, such as during testing, and even more so later in operations and support of the system. To facilitate compliance, ESOH requirements should be fully evaluated early in the program, and then periodically reevaluated. In accordance with DoD 5000.2-R (Defense Acquisition Deskbook), the PM must regularly review ESOH compliance requirements and evaluate their impact on the program.

The guide is organized into six chapters:

- **Chapter 1 provides an introduction to the guide, and includes a list of sources for additional ESOH-related assistance, guidance, and information.**
- **Chapter 2 provides an overview of the acquisition life cycle.**
- **Chapter 3 describes the importance of identifying program life-cycle activities when determining applicable ESOH compliance requirements. Specific program issues to consider are described along with discussions on the elements and unique activities associated with each Army weapon system category (commodity).**

- **Chapter 4 provides a comprehensive summary of those federal, DoD, and Army ESOH-related regulatory requirements common to most acquisition programs, along with those requirements unique to specific weapon system categories (commodities). A brief overview of state and local agency and foreign nation regulatory requirements is also provided.**

- **Chapter 5 identifies ESOH-related activities and documentation requirements normally associated with each life-cycle phase.**

- **Chapter 6 lists the references that were used in preparation of the guide.**

ACCOMPLISHMENTS AND RESULTS

The U.S. Army Environmental Center completed the draft Guide to Environmental, Safety, and Occupational Health (ESOH) Compliance for Army Weapon Systems in October 2001. The USAEC conducted an internal review on the Guide to Environmental, Safety, and Occupational Health (ESOH) Compliance for Army Weapon Systems. USAEC comments were incorporated on the Guide to Environmental, Safety, and Occupational Health (ESOH) Compliance for Army Weapon Systems (September 2002). The U.S. Army Environmental Center (USAEC) has published an updated edition of the Guide to Environmental, Safety, and Occupational Health (ESOH) Compliance for Army Weapon Systems (February 2004).

FOLLOW-ON PROGRAM REQUIREMENTS

USAEC shall continue to research new ESOH Compliance requirements and ESOH Compliance requirements on the horizon and periodically update the Guide to Environmental, Safety, and Occupational Health (ESOH) Compliance for Army Weapon Systems electronically on the Web site.

PROGRAM PARTNERS

U.S. Army Environmental Center
U.S. Army Space and Missile Defense Command
Teledyne Solutions Incorporated

IN SITU CHEMICAL OXIDATION TREATMENT SYSTEM AT LETTERKENNY ARMY DEPOT

The *in situ* chemical oxidation treatment being pilot-tested at Letterkenny Army Depot ensures effective and efficient removal of contaminants of concern, an improvement over the existing pump-and-treat system.

PURPOSE

To design and implement an effective chemical treatment system for Letterkenny Army Depot, an installation on the National Priorities List.

BENEFITS

If installed successfully, this treatment system will help remove volatile organic compound (VOC) contamination at the source area, and help reduce long-term treatment requirements.

TECHNOLOGY USERS

Letterkenny Army Depot, Chambersburg, Pennsylvania

DESCRIPTION

Peroxone was injected into the karst aquifer through a network of carefully placed wells. The system is designed to displace the underlying water and treat volatile constituents bound to the soil media. Utilizing this *in situ* oxidation technique, we were able to evaluate the performance of this technology for its effectiveness in remediating contaminants at the source. The U.S. Army Environmental Center has conducted a successful bench-scale test and pilot test of this system. A final report will be available on the U.S. Army Environmental Center's Technology Web site.

ACCOMPLISHMENTS AND RESULTS

Testing was completed at Rocky Spring. It was possible to rule out the use of a C-Sparge treatment system and move forward with the *in situ* chemical oxidation approach. Additionally, the use of Fenton's Reaction was eliminated at this particular site, and a more practical chemical oxidant was chosen.

PROGRAM PARTNERS

U.S. Army Corps of Engineers
Interstate Technology and Regulatory Council

FIELD ANALYTICAL TECHNOLOGY

The major source of error associated with an analytical result is derived from sampling, yet little has been done to improve the sampling process. A cost-effective method to accurately determine the distribution of contaminants will benefit Army site-remediation efforts.

PURPOSE

To create a procedure whereby the error associated with collecting soil samples can be applied correctly to the analytical results; to develop a strategy and procedure to determine explosives contamination at impact ranges; and to adapt it to other analytes when appropriate.

BENEFITS

A cost-effective method to determine the distribution of contaminants will benefit the site-remediation process. Because they contain unexploded ordnance (UXO), impact ranges present a unique cleanup challenge. Some Records of Decision require the Army to deal with explosives before addressing UXO. The developed strategy will allow installations to handle this scenario.

TECHNOLOGY USERS

Army installations with explosives-contaminated soils

DESCRIPTION

The major source of error associated with an analytical result is derived from sampling, but little has been accomplished to improve the sampling process. Previous sampling was based on a specified grid approach, using a limited set of discrete samples, which resulted in extreme sampling error for nonhomogenous distributed contaminants such as explosives. True and cost-effective determination of the distribution of contaminants is essential to the site-remediation process.

A site contaminated with cyclotetramethylene (HMX) and trinitrotoluene (TNT) will be assessed. A final report will document the sampling and analytical errors associated with short-range and longer range analyte distributions for this site. The report also will document improvements in site characterization that result from the use of a composite-based sampling procedure and on-site analysis, and address whether this approach reduced sampling error to acceptable levels for the site.

Additional sampling and analysis studies will be conducted to demonstrate the effectiveness of the combination of on-site analytical methods and simple composite sampling procedures. Sites contaminated with Royal Demolition Explosive (RDX) and nitroguanidine (NQ) will be sampled (if available), as well as a non-explosives-contaminated site, to assess whether levels of heterogeneity at these sites are similar to those observed for sites contaminated with TNT, dinitroluene (DNT), ammonium picrate and HMX. An evaluation will be performed between field analytical results and laboratory analytical results.

ACCOMPLISHMENTS AND RESULTS

In Phase 1 of this project, several explosives-contaminated sites were intensely sampled to obtain information on the short-range heterogeneity of analyte distribution as a function of the specific contaminant, mode of contamination, and soil type. The samples were analyzed both on and off site.

These results were used to compute overall analytical error. The on-site analytical methods for TNT, DNT, and picric acid provided adequate data for site assessment at much lower costs. Based on these results, various strategies to minimize sampling error were considered, and a larger-scale sampling strategy was proposed.

This approach was evaluated in Phase 2 at a site contaminated with HMX and TNT. Analysis of larger scale sampling and analytical results indicated that an approach based on discrete grab sample collection and analysis could not adequately describe analyte concentrations. A rapid compositing approach was assessed, and the analysis of these results showed this was the best approach for sampling nonhomogenous distributed contamination. This approach was further validated at a site contaminated with RDX and TNT. It also underwent preliminary testing at an impact range.

In the next phase, a pilot study on applying the sampling strategy learned from the previous effort was performed at an inland impact range at Fort Ord, California. Because of the UXO issue, the strategy was modified to include actual sampling being performed by Explosive Ordnance Disposal (EOD) personnel. Sampling was also modified to address the effects of long-range heterogeneity. Experiments were conducted to assess the utility of a gas chromatograph-nitrogen/phosphorous detector method for on-site analysis of explosives in soil. Results were promising in that they allowed measurement of RDX in the presence of large amounts of HMX, a contaminant situation often encountered at anti-tank firing ranges.

The field analysis using the gas chromatographic (GC) method was further tested with both a nitrogen/phosphorus detector and an electron capture detector. Various archived samples were checked by the GC technique, with good results when compared to standard explosives analyses. To field test the technology, participation was sought and received from the Environmental Protection Agency (EPA) for their Environmental Technology Program for the Evaluation of Explosive Field Analytical Techniques at the Oak Ridge National Laboratory. A new version of the GC was tested at this time. The chromatograph was configured so that air could be used as the carrier gas, which allowed for extreme portability of the system. At the same time, a thermionic ionization detector, a new detector more sensitive to explosives, was tested. Preliminary results show very good correlation for the TNT analyses. However, some breakdown in the RDX analysis occurs when using air as the carrier gas.

In fiscal year 2000, modifications to the gas/injector system were made. The performance of the chromatograph was much improved when nitrogen was used as the carrier gas, while continuing to use air for the detector. The instrument

was used in two field trials (at Fort Leonard Wood and at the Umatilla Army Depot) and was able to demonstrate the ability to differentiate between 2,4–DNT, TNB, TNT, RDX, and HMX. Some of the breakdown products of TNT that are not usually detectable by existing field tests (aminodinitrotoluenes and diaminonitrotoluenes) were determined by this technique. Participation in a second EPA Environmental Technology Validation demonstration has shown the much-improved performance of the gas chromatographic system. There was good correlation between the results from the field gas chromatographic system with the results from a reference laboratory.

In fiscal year 2001, the field gas chromatographic system was further validated at additional sites, including Fort Leonard Wood and Fort Greely. Results compared very favorably with results on samples submitted to the laboratory, with analysis being performed using the standard high performance liquid chromatography (8330) and gas chromatography (8095) methods. A number of drafts of the guide on the field sampling and analysis of explosives were prepared, reviewed, and revised to address comments. The guide will be usable by field personnel for the sampling and analysis of explosives at any site. An Internet seminar entitled "Field Based Analytical Methods for Explosives" was developed and presented through the U.S. Environmental Protection Agency Technology Innovation Office.

Results from previous studies have documented the extreme spatial heterogeneity that is present for explosives residues in soil at a wide variety of explosives-contaminated sites. In order to obtain representative samples for estimating mean concentrations, multi-increment (composite) samples are necessary. The number of individual increments necessary to obtain a mean value with an acceptable level of uncertainty, however, is not known for any of the types of sites that the Army needs to characterize.

In FY02, soil samples were collected at several explosives-contaminated sites. At each site, a sampling zone of about 10 m x 10 m was selected based on on-site measurements or historical information, to ensure that the site was contaminated with explosives residues. Surface composite soil samples were randomly collected within this zone using 1, 5, 10, 20, and 40 individual increments. Five replicate samples for each increment number were collected. The samples were mechanically ground and triplicate 10 g replicates of each were analyzed to reduce the subsampling and determinative variances, so the variability obtained would be predominantly due to the sampling method.

The data was analyzed using analysis of variance techniques and the sampling uncertainties were computed as a function of the number of increments. Results to date indicate that the approach may have to be specific to the various types of sites (e.g., burning grounds, demolition ranges, anti-tank ranges, artillery ranges, firing points). In general, composite samples are a vast improvement over discrete samples with respect to representativeness and the number of increments required will be different depending on the degree of spatial heterogeneity for a given type of sampling area. A report, in

production, will provide the results of the study.

Past studies have also indicated that the uncertainty associated with site characterization for explosives-contaminated areas is largely due to the inability to collect representative samples and obtain a representative subsample for analysis. In the laboratory, samples can be air-dried and thoroughly homogenized, thereby minimizing the uncertainty introduced by the necessity of subsampling to provide the proper mass of soil for extraction and analysis. In order to use on-site methods, though, subsampling must be done using moist soil and without the types of equipment available in many laboratories. The inability to obtain proper subsamples in the field is one reason why data from on-site analysis and laboratory analysis often do not agree very well. The on-site methods are often blamed for these differences when, in fact, portions of soil with very different analyte contents are analyzed.

The intent of this sub-task was to evaluate various on-site, soil subsampling strategies. The sampling literature was assessed to develop a list of alternate strategies. An initial field study evaluated the most promising alternatives. Results from that study were used to refine the alternatives, which were then evaluated in a second field study. A report provides the results of these studies.

In FY03, work to be concluded in early FY04 continued on on-site sample preparation. Field experiments were conducted at a number of sites having different soil types and meteorological conditions.

FOLLOW-ON PROGRAM REQUIREMENTS

The subsampling strategy that has been developed for subsampling in the field has been tested on some types of soils. The developed procedures need to be tested at sites that contain the types of soils that are most typically encountered. Additional effort needs to be expended on methodology for the field determination of typical Army contaminants in the environment, especially those that have proven to be recalcitrant to analysis in the past.

PROGRAM PARTNERS

U.S. Army Environmental Center
U.S. Army Engineer Research and Development Center-Cold Regions Research and Engineering Laboratory

PUBLICATIONS

Assessment of Sampling Error Associated with Collection and Analysis of Soil Samples at Explosives-Contaminated Sites. CRREL Special Report 96-15.
EPA ORD/OSWER. Field Sampling and Selecting On-Site Analytical Methods for Explosives in Soil – EPA Federal Facilities Forum Issue. Report EPA/540/R97/501. November 1996.

Assessment of Sampling Error Associated with Collection and Analysis of Soil Samples at a Firing Range Contaminated with HMX. CRREL Special Report 97-22.

Site Characterization of the Inland Firing Range Impact Area at Fort Ord. CRREL Special Report 98-9.

Determination of Nitroaromatic, Nitramine, and Nitrate Ester Explosives in Water Using Solid-Phase Extraction and GC-ECD: Comparison with HPLC. CRREL Special Report 98-2.

Determination of Nitroaromatic, Nitramine, and Nitrate Ester Explosives in Soils by Gas Chromatography-Electron Capture Detection. CRREL Special Report 99-12.

On-Site Method for Nitroaromatic and Nitramine Explosives in Soil and Groundwater Using GC-NPD. CRREL Special Report 99-9.

Field Gas Chromatography/Thermionic Detector System for On-Site Determination of Explosives in Soils. ERDC-CRREL Special Report TR-01-9.

Explosives Detection Technology, SRI Instruments Model 8610C, Gas Chromatograph/Thermionic Ionization Detection. Environmental Technology Verification Report. EPA/600/R-01/065, August 2001.

Guide For Energetic Materials Contaminated Site Characterization. ERDC/CRREL Report TR-02-1.

Field Based Analytical Methods For Explosives. Internet Seminar. Available at www.clu-in.org/.

On-site Processing and subsampling of Surface Soil Samples for the Analysis of Explosives. ERDC/CRREL TR-03-14.

REMEDIATION TECHNOLOGIES SCREENING MATRIX AND REFERENCE GUIDE

Several Web-based tools exist that aid environmental project managers to make intelligent, informed decisions on cleanup technologies, but few are as comprehensive as the FRTR Remediation Technologies Screening Matrix and Reference Guide. The Federal Remediation Technologies Roundtable (FRTR) developed this guide to serve as a neutral platform from which to evaluate technologies from all media areas.

PURPOSE

To manage and update the FRTR Remediation Technologies Screening Matrix and Reference Guide, Version IV. Enhance user-friendliness, increase awareness of the document, foster close cooperation between government agencies, and provide an improved technology transfer product to both environmental technology users and the research and development community.

BENEFITS

The guide serves as a "one-stop shopping" document, allowing remediation project managers to sort through volumes of information in a direct and guided manner, saving them time and effort. The guide is also recognized as a comprehensive source for environmental restoration technology information.

TECHNOLOGY USERS

Remediation project managers, government agencies, private organizations, and academia

DESCRIPTION

In the past, numerous government agencies, divisions, and branches produced documents as tools for their environmental project managers. The FRTR sponsored production of the FRTR Remediation Technologies Screening Matrix and Reference Guide, Version III to eliminate the duplication of effort among its member agencies.

The document is Web-based, allowing for quick and easy updating. The update effort encourages Roundtable members to work together, leverage funds and resources, and prevent duplication of effort.

The committee representatives, who have the option to serve as a review entity for each technology, select technologies to be included in the guide. After the document is written and reviewed, the information is formatted in HTML, integrated with all necessary hyperlinks, and placed on the Internet for universal use. Currently, members of the committee are in the process of completing the Remediation Technologies Screening Matrix and Reference Guide, Version IV.

The current World Wide Web version of the FRTR Remediation Technologies

Screening Matrix and Reference Guide, located on the FRTR home page, replaced Version III. Web technology advancements enable the Roundtable the opportunity to update and modify this "living" document. Each week, the guide is reviewed for inactive links and outdated or incorrect information. New information is reviewed and evaluated for validity. This regular maintenance ensures the document's integrity.

ACCOMPLISHMENTS AND RESULTS

This project helps to demonstrate and foster cooperation among many federal agencies. Committee members established the personal relationships necessary to coordinate the update effort. There was a successful leveraging of resources from the Army, Navy and Air Force. The Environmental Protection Agency donated significant support. Other agencies dedicated numerous in-house personnel hours toward the effort.

The document was released on the Web at www.frtr.gov in November 1997.

LIMITATIONS

The document is an electronic Web file, so there is no conveniently accessed paper version. Links must be continually monitored and information updated.

FOLLOW-ON PROGRAM REQUIREMENTS

Environmental technologies are continually changing and being improved. Updates to the current version are ongoing and will be published in October 2003. Committee members have decided the most effective way to keep the guide current and useful is to conduct annual meetings and reviews of existing material.

PROGRAM PARTNERS

U.S. Army Environmental Center
U.S. Army Corps of Engineers
Federal Remediation Technologies Roundtable
Naval Facilities Engineering Service Center
Air Force Center for Environmental Excellence
Environmental Protection Agency
U.S. Geological Survey
Department of Energy
Interstate Technology and Regulatory Council

PUBLICATIONS

Federal Remediation Technologies Screening Matrix and Reference Guide, Version IV. April 2002.

ALTERNATIVE CLEANER MATERIAL COMPATIBILITY AND PERFORMANCE AND EVALUATION PROGRAM

The U.S. Army Environmental Center (USAEC) and the U.S. Army Aberdeen Test Center (ATC) have partnered in the Alternative Cleaner Material Compatibility and Performance Evaluation Program to facilitate test and evaluation of alternative cleaners proposed as substitutes for hazardous, toxic, and flammable solvents.

PURPOSE

The purpose of the Alternative Cleaner Material Compatibility and Performance Evaluation Program is to provide a mechanism to collect data and evaluate alternative cleaner applicability in U.S. Army/Department of Defense (DoD) maintenance, cleaning, and repair activities. Associated goals include quantifying and qualifying user needs; maintaining protocols for material compatibility and performance evaluation test and evaluation; conducting and providing defensible data through test and evaluation; documenting results and lessons learned; facilitating the development and use of a usage decision tool; targeting proven results to meet user specific needs; and promoting participation within public, private, and academic sectors.

BENEFITS

The primary benefit derived from the Alternative Cleaner Material Compatibility and Performance Evaluation Program has been the development of the program's test and evaluation protocols. The development, endorsement, and use of a set of uniform protocols by the various Army commodity commands prevents the need to test products several times under differing methods and criteria, and thus reduces the possibility for duplication of effort. This benefit reduces the needless expenditure of time, resources, and manpower that could otherwise be used for acquisition, infrastructure, or training.

Better understanding of user needs and dissemination of knowledge of the approval process throughout the Department of the Army are critical components and major benefits of the Alternative Cleaner Material Compatibility and Performance Evaluation Program. To realize ultimate success, it is vitally important that purchasing organizations and field activities be made aware of the detrimental effects the use of unproven and unauthorized cleaners can have on their mission, material, and readiness.

The Army will be better able to preserve readiness, save money, and avoid bad decisions by knowing which alternative cleaning products meet its stringent requirements for performance, soldier safety, and environmental compliance. Participation will help vendors and manufacturers maximize marketing resources and will alleviate the need to do product-specific evaluations at the direction of each potential user or customer, thus saving significant time, money, and resources. In addition, vendors and manufacturers will have an accepted process for evaluating their products for possible defense procurement.

TECHNOLOGY USERS

Results, products and efforts originating from this program will benefit project and product managers throughout the acquisition community, environmental staffs at major U.S. Army commands and installations, other DoD services and government agencies, and original equipment manufacturers (OEMs).

DESCRIPTION

A couple decades ago, no one expected the use of solvents in general maintenance, cleaning, and repair operations to come under the scrutiny it did. The long-term effects of solvent use on worker health and the environment and the impact that regulations would have on procurement, storage, use, and disposal were unknown. Many federal, state, and local laws and regulations now limit the use, storage, and disposal of hydrocarbon-based cleaning solvents due to their classification as hazardous, flammable, and toxic substances. Unfortunately, the Army and other defense agencies rely on these solvents to maintain unique, mission-critical systems and materiel.

The transition from the use of solvents to more environmentally friendly alternatives is a relatively recent phenomenon. Alternative cleaners have the potential to reduce solvent use and provide significant economic benefits. Unfortunately, an environmentally friendly designation is in no way associated with a product's ability to perform a particular task (e.g., cleaning, stripping, or polishing). Nor is it an indication of whether it is compatible with the object to be clean, polished, or stripped.

Alternative cleaners have the potential to reduce solvent use and provide significant economic benefits. An inherent problem in selecting and using alternative cleaners, however, is that selection mistakes are often made because many products marketed are listed in Defense Logistics Agency (DLA) catalogs as "environmentally friendlier" or have a General Services Administration (GSA) contract number. Although an alternative cleaner may have an environmentally friendlier designation, that designation does not mean that the product's performance has been verified or that it is authorized for military use. In many instances, assumptions based on these designations have led purchasing organizations to procure alternative cleaners without realizing the potential impact to soldiers who use them, the materiel items they are used on, and ultimately, readiness.

Another problem is that many purchasing organizations are unaware of the approval process or that validation is needed before making any changes to maintenance procedures or cleaning regimens. As a result, the uncontrolled replacement of solvents with environmentally friendly products has resulted in a number of use, approval, and material compatibility problems. Problems such as these have driven the need to better understand performance requirements, establish evaluation standards, prevent duplication of effort, and facilitate expeditious review and approval of alternative cleaner use where appropriate.
The compatibility and performance of alternative cleaners proposed as

substitutes for solvents currently used must be determined and demonstrated and their use approved by the respective commodity managers of weapon systems. The Alternative Cleaner Material Compatibility and Performance Verification Program put in place mechanisms to achieve this objective.

Building on past experience and lessons learned, the Army has launched a project that will allow manufacturers to evaluate the performance of alternative cleaning solvents on military equipment. Using the protocol developed recently in partnership with commodity managers, the USAEC and ATC are leading an initiative to comprehensively test several cleaning products and gather data the Army and other DoD services can use to make procurement and usage decisions.

The current program test protocol can be found on the USAEC Web page at http://aec.army.mil. It should be noted that the protocol performance requirements and test methods may change at any time as directed by commodity command approval authorities. However, if any changes are made to the protocol before, during, or after testing, due notice of those changes shall be given.

The Alternative Cleaner Material Compatibility and Performance Evaluation Program requires that potential technologies submitted for evaluation satisfy certain selection criteria. Alternative cleaners submitted for evaluation must be environmentally beneficial compared to hydrocarbon solvents currently being used, have obvious economic benefit, and have pollution prevention qualities that can be tested and presented as valuable evaluation factors to the commodity approval authorities. Cleaners to be tested also should be commercially ready for implementation. This means that they should be beyond the conceptual stage and logistically available, maintainable, supportable, and reliable. The concept of commercially ready will be evaluated on a case-by-case basis and will be dependent on availability for the target user and volume of delivery required by the user. An attractive aspect of the program is that a pre-screening regimen has been developed that will assist private industry participants in determining if it is economically beneficial to proceed with full-scale performance evaluation.

Each product submitted for testing will be reviewed to determine if the submission meets the above criteria. Candidates for evaluation testing will be selected based on several factors, including passing a pre-screening, having demonstrated and documented success in public or private sectors in the past, having virtually non-existent environmental impact, low economic risks for implementation, realistic potential to meet performance requirements, and practicality of implementation.

Meetings with potential private industry participants are scheduled. The meetings will ensure understanding of program objectives, private industry roles and the test and evaluation scope, including environmental evaluation

factors, performance and quality evaluation factors required for approval, user implementation decisions, data valuable to technology providers to promote products, and data valuable to end users of the product. For evaluation testing, the USAEC and ATC will include all interested private industry participants whose products meet the defined requirements and who are willing to provide the fee determined after all responses have been received.

Testing is being jointly funded; cleaner manufacturers will pay for the tests on their specific products, while the Army will maintain overall test capabilities and purchase materials needed to conduct the test. Private industry participants will be required to contribute funds towards completion of testing. Under the terms of the program, private industry participants will be required to pay for compatibility and performance testing of their specific products while government funds will be used to qualify manufacturer- or vendor-furnished data, to perform test set up, to purchase military-unique materials required for testing, and to conduct material compatibility and performance evaluation testing. Alternative solvent manufacturers will realize significant cost savings under this program due to economies-of-scale and cost sharing. The minimum private industry contribution for evaluation will be determined by the amount of funds available to support testing, the cost to perform the testing per product, and the number of technology providers participating.

Participants involved in the evaluation process will go through a thorough screening process to decide which products to put through the full range of material compatibility and performance evaluation tests. ATC will conduct compatibility and performance evaluation allowing technology providers to participate as observers on designated occasions. Parameters evaluated will focus on constituent evaluation, material compatibility, and environmental quality benefits reflective of the alternative cleaner in Phase II and performance evaluation in Phase III. The result of compatibility and performance evaluation testing will be a final report that will be prepared by ATC for private industry participant consumption and the commodity manager approval process.

Government evaluation testing by ATC will be performed pursuant to a Test Support Agreement executed by ATC with each participating private party. Evaluation testing will be executed by ATC staff at ATC's facilities unless ATC does not have the existing capabilities to do so. In this case, another laboratory having the desired expertise will be used. Confidential or proprietary information may be required to be released for government consumption only as necessary to evaluate constituents or to determine a cleaner's potential impact on the environment, safety, and occupational health. It is recommended that this type of information be kept to a minimum until as required to permit, begin, and perform testing.

The ATC is responsible for maintaining the evaluation protocols (i.e., making changes and tracking review and comment), evaluating and verifying data, conducting the evaluation testing, preparing a draft evaluation report for

review and comment by commodity approval authorities and private industry participants, and preparing and disseminating the final report and any other related information. Final reports provided to private industry participants shall be a sanitized version containing the industry participant's data and results only. The version of the final report provided to the commodity commands shall be used to identify solvent substitutes that meet stringent military maintenance, cleaning, service, and repair performance requirements and to update or prepare qualified products lists (QPLs).

The test and evaluation process is considered complete when the final report has been provided to commodity approval authorities. Follow-on requirements after testing include facilitating the decision process regarding acceptable alternative cleaner usage. A workgroup has been established that includes representatives from the user, approval authority, and private industry communities. Private industry participants will have the opportunity to provide input to future program direction and protocol development. The public and private partnership seeks to prevent duplication of effort, encourages the acceptance of alternative cleaners where appropriate, and helps to identify the most viable markets for technology insertion.

The program has an aggressive strategy for information dissemination. Results of the evaluation will be distributed to all applicable users as deemed appropriate by commodity command approval authorities, to increase awareness of technically and commercially viable alternative cleaners (this assures the maximum exposure and visibility of the results of the evaluation). Although the U.S. government can endorse no verified product, the DoD or its agencies completing performance evaluation testing will enhance the acceptance and use of alternative cleaners. This program promotes pollution prevention by providing a viable mechanism to facilitate performance evaluation of solvent substitutes through active participation of users, private industry, and approval authorities.

APPLICABILITY

Many federal, state, and local regulations limit the use, storage, and disposal of hydrocarbon-based cleaning solvents. This program supports initiatives in response to the 1990 Pollution Prevention Act and Executive Order 12856 that mandate federal agencies implement measures to address waste reduction and pollution prevention at the source.

LIMITATIONS

Unfortunately, it is unlikely that an alternative cleaner replacement will be found for hydrocarbon solvents currently used in U.S. Army and DoD maintenance, cleaning, and repair activities. Although manufacturers and vendors will realize substantial benefits participating in the Alternative Cleaner Material Compatibility and Performance Evaluation Program, they may still have to be actively involved in optimizing potential solutions to meet specific user requirements. This may involve tasks such as performing on-site demonstrations, training installation staff, or reconfiguring and refining

equipment and processes.

PROGRAM PARTNERS

U.S. Army Environmental Center

U.S. Army Aberdeen Test Center

U.S. Army Forces Command

U.S. Army Research Laboratory

U.S. Army Petroleum Center

U.S. Army Aviation and Missile Command

U.S. Army Armament, Development, and Engineering Center

U.S. Army Center for Health Promotion and Preventive Medicine

U.S. Army Tank Automotive and Armament Command

U.S. Army Tank Automotive Research and Development Center

U.S. Army Pollution Prevention Support Office

U.S. Army Integrated Product Teams

National Defense Center for Environmental Excellence

Naval Facilities Engineering Service Center

Naval Cognizant Field Activities

Naval Air Warfare Centers

Marine Corps Systems Command

U.S. Air Force Center for Environmental Excellence

U.S. Air Force Corrosion Prevention and Control Office

U.S. Air Force Petroleum Office

CONCLUSION

Environmental laws, regulations, practices, initiatives and lessons learned during the last century have permanently changed today's military-industrial complex and how it deploys troops, maintains bases, and adheres to laws. Today more than ever, we understand the tremendous financial cost and know the unfortunate environmental, health, and safety risk associated with the routine use of hazardous, toxic, and flammable solvents.

Those lessons having been learned, the USAEC and ATC have established the Alternative Cleaner Material Compatibility and Performance Evaluation Program to promote and enable evaluation, approval, and routine use of environmentally acceptable solvent substitutes where their use can be technically and physically proven to not adversely affect military readiness, soldiers, or materiel.

ACCOMPLISHMENTS AND RESULTS

This program promotes pollution prevention by providing a viable mechanism to facilitate performance evaluation of solvent substitutes through active participation from approval authorities, users, private industry, and academia. The program is quickly gaining wide acceptance among the tri-services as well as throughout private industry.
Success in the program to date includes the establishment of materials compatibility test protocols developed in cooperation with and endorsed by major commodity commands responsible for approving solvent substitute use on Army materiel items.

PUBLICATIONS

Technical Protocol. Alternative Cleaner Compatibility and Performance Evaluation Test Protocol. July 2000. SFIM-AEC-ET-TR-99062.

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Technical Report. Field Demonstration for P-D-680 Solvent Replacement (Part II). May 1998. TARDEC Technical Report No. TR-13751.

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13643.

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Technical Paper. Evaluating the Impact of Environmentally Friendly Alternative Cleaners on System Readiness. April 2001. Ziegler and Walker.
Technical Paper. Developments in US Army's Alternative Cleaner Compatibility and Performance Evaluation Program. May 2001. Ziegler and Walker.

Technical Paper. Alternative Cleaning for DOD Applications. June 2001. Ziegler.

CHANGING DYES IN SMOKES

Regulatory enforcement of environmental laws and regulations continues to expand with regard to munitions production and military range operations. Particularly, a rapid trend has developed towards the increased accountability of the Department of Defense (DoD) for the emissions from the use of munitions items during training and testing operations.

PURPOSE

In 1997, the need to quantify the emissions resulting from munitions use, and to assess the risk to human health and the environment from these emissions, was identified as a critical issue for the U.S. Army and the other services. Environmental Protection Agency Region I requested information on the emissions and residues from the use of munitions at the Massachusetts Military Reservation (MMR). DoD was unable to provide the requested data and thus could not present any valid assessment of the impacts from the use of munitions there. Since that time, additional data requirements such as Emergency Planning and Community Right-to-Know Act-Toxic Release Inventory (EPCRA-TRI) reporting have evolved.

In September 1997, the Chief of Staff of the Army directed the Assistant Chief of Staff for Installation Management (ACSIM) to establish a general officer steering committee to address the implications of the restrictions on operations at MMR. The ACSIM directed and funded the U.S. Army Environmental Center (USAEC) to gather emissions data. The USAEC has developed a comprehensive program to identify the emissions resulting from range operations that involve weapons firing, smoke and pyrotechnic devices, and exploding ordnance, and to assess the environmental and health hazard impacts resulting from their use. In the execution of that program, it was discovered that two of the colored signal smoke grenades contain and emit toxic smokes and dyes in significant quantities. These signaling items are critical to training and combat operations and provide a method to immediately cease operations in the event that safety issues or operational needs are identified. These dyes/smokes may present a risk to the soldier, any nearby receptors, and to production and test personnel. It is in the best interest of the Army and DoD to demonstrate and implement a material substitution for the dyes/smokes in these specific munitions items.

BENEFITS

The substitution of dyes in these two smoke grenades will complete efforts for the reduction of toxic materials from the signaling and smoke devices. This will provide reduced risk to soldiers, the environment, and surrounding communities. In addition, this will reduce the potential for restricted operations and for fines and penalties associated with the impacts of these items. Training realism will be maintained due to the lessening of restrictions. This next generation of colored smokes, while having less impact on the environment, will also provide a very real training and operational capability for the soldier.

TECHNOLOGY USERS

Soldiers
Installations
Police
Department of Transportation

DESCRIPTION

Several alternative materials have been identified, but funding is required to validate the functional and operational capabilities of these items with the alternative (less toxic) dye and smoke materials, prior to their implementation.

ACCOMPLISHMENTS AND RESULTS

The test smoke grenades have been developed. During the testing, new techniques were developed and utilized that have reduced the cost of production of these two smoke grenades. This was accomplished through the use of starter patches and material changes in the composition of the starter and smoke material that have made the production simpler and lowered the temperature of the burning materials to keep it from flaming. Pilot and production quantities of the red smoke grenades have been produced that meet the technical needs but which are having the dye combination adjusted to meet the visual requirements of the military community. Pilot and production quantities of the violet smoke grenades are on hold pending determination of the status of the red smoke grenades. Final grenades will be available in calendar year 2004 and will be tested under the emissions characterization program prior to integration in training, if they are adapted.

LIMITATIONS

The new smoke grenades must meet military standard criteria. To complete the transition, the new smoke formulations must meet Soldier, Observer, and Maintainer Test and Evaluation requirements. This requirement includes a color comparison, part of the Production Validation Test (PVT). The color comparison includes soldiers testing the items on the ground as well as helicopters flying over to ensure the color is accurate from the sky. The actual PVT is a testing of the item that was produced outside the normal line production. After completion of the PVT, an Environmental Fate Assessment will occur. Upon completion of the environmental testing, an inhalation and toxicology assessment occurs. After all of these have been completed, the Material Change Approval is issued. After the change in formulation, a phased-in production occurs. The first article states that a large sample of the items is to be tested to ensure they can be made by line operators and function as intended. After this final testing, the material is released for full-scale production and use.

PROGRAM PARTNERS

Environmental Security Technology Certification Program
West Deseret Test Center, Dugway Proving Ground
Pine Bluff Arsenal
Edgewood Chemical and Biological Center
Environmental Protection Agency

PUBLICATIONS

Planned publications are for Production Quality Testing and Environmental Design Tests.

IMPACT AREA EVALUATION

UNEXPLODED ORDNANCE CORROSION

Testing and training operations using exploding ordnance continue to play a key role in maintaining the readiness of the warfighter. Roughly 3.5 percent of the rounds used in these operations malfunction, resulting in unexploded ordnance (UXO). Many of these UXO contain high explosives (HE). UXO exists at impact areas on the surface and buried in soil, in wetlands sediment and in water, under both aerobic and anaerobic conditions. Data on the condition of existing UXO and its impacts on the environment have not been collected or evaluated. Additionally, factors that may affect the condition of UXO (such as munition type, soil type, aqueous conditions, and pH) have not been evaluated. This study evaluates the rate and mode of UXO corrosion. It will also collect soil explosives concentrations beneath a small number of ordnance on approximately 10 ranges.

PURPOSE

To provide the U.S. Army with a tool to assess the site-specific years to perforation for unexploded ordnance (UXO), and evaluate under what conditions, if any, UXO might place explosives into soils on ranges.

BENEFITS

This project will enable installation range managers to evaluate the potential risk from UXO corrosion and release of munitions-related compounds on their installations. We are developing a user-friendly computer tool that provides the number of years to perforation for a user-specified thickness of metal. This computer tool can be used as a program management aid, giving the range manager information to manage the need and timing for range maintenance. Environmental restrictions on training U.S. military personnel will be minimized. Future cleanup costs may be reduced. Furthermore, the environmental stewardship observed will enhance both public image and trust.

TECHNOLOGY USERS

U.S. Army Installations
U.S. Army Corps of Engineers
Risk assessment community

DESCRIPTION

The Army has a growing need to respond to regulatory questions about the environmental impact of UXO in and around firing ranges. As a result, the University of Louisiana at Lafayette, Praxis Environmental Technologies, the Naval Research Laboratory, and the U.S. Army Corp of Engineers in Huntsville, under the direction of the U.S. Army Environmental Center, has established a program to address these issues. The Strategic Environmental Research and Development Program funds the project, in part. The data to be gathered for this program provide information on the likelihood of UXO to degrade to the point of perforation. This work addresses if and how conventional UXO on military test ranges corrodes over time and provides the parameters, assumptions, and constraints of the modeling techniques being used in the development of this UXO corrosion model. Current modeling efforts will involve using first principles and literature-reported rates of steel corrosion in soils, and UXO pit depths from a variety of soil and climate types, to revamp the 1999 UXO version of the UXO corrosion empirical algorithm. Corrosion modeling based on soil type, and any corrosion by-products, will be performed using techniques under development at the University of Louisiana at Lafayette. The results of this modeling effort will provide input (time to perforation) in future range risk assessments.

Ongoing work will gather additional UXO corrosion data (200 UXO) from approximately 10 sites where the UXO age is well constrained and over a variety of soil and environmental conditions that may influence corrosion rates. The data generated will support the U.S. Army and Army installations in assessing the environmental impact of weapons firing as a part of testing and training operations.

ACCOMPLISHMENTS AND RESULTS

We sampled 10 sites and gathered approximately 170 ordnance samples for corrosion and associated properties. Final report, corrosion model, and database are in draft form with finalization expected January 2004.

FOLLOW-ON PROGRAM REQUIREMENTS

The demonstration validation phase of the project will take place in FY04 with 3 to 4 additional sites and 50 more samples to corroborate model prediction for those sites. Sites with the most extreme conditions will be chosen to test the model's performance.

PROGRAM PARTNERS

U.S Army Environmental Center

The Strategic Environmental Research and Development Program (SERDP)
Praxis Environmental Technologies
The U.S. Army Engineer Research and Development Center (ERDC) Environmental Laboratory and Cold Regions Research and Engineering Center
Louisiana State University-Lafayette, Corrosion Research Center
The Naval Research Laboratory
U.S. Army Corp of Engineers, Huntsville, Alabama
The U.S. Army Center for Health Promotion and Preventive Medicine
Cedric Adams and Associates

UXO TECHNOLOGY DEMONSTRATION PROGRAM

The Department of Defense continues advancing methods to detect, locate, discriminate, neutralize, recover, and dispose of unexploded ordnance (UXO). The UXO Technology Demonstration Program was initially conducted at Jefferson Proving Ground (JPG), Indiana. The success of that program necessitated that a new program be instituted this past year, the Standardized UXO Technology Demonstration Site Program. The experience gained from the Standardized UXO Technology Demonstration Site Program will provide the UXO technology developer with sites for the UXO sensor-system technology testing and demonstration. Other products resulting from the program include a screening matrix of system performance, a standardized target repository, standardized protocols for performing geophysical prove-outs and a variety of technology transfer and marketing materials.

PURPOSE

To evaluate, establish, and advance UXO technology performance and make it available to the stakeholders.

BENEFITS

This program has created an in-field experience for the evaluation of UXO technologies in a "real" world situation under controlled conditions. Baseline technologies were established under the JPG Program, and now technology users will be able to advance these baseline technologies using established Standardized UXO Technology Demonstration Sites located at the Aberdeen Proving Ground in Maryland and the Yuma Proving Ground in Arizona (March 2003). In addition, data collected at these sites will support the development of software algorithms for the detection and discrimination of buried UXO. This program will contribute to the safer and more efficient remediation of UXO sites.

TECHNOLOGY USERS

Military installations with sites that contain UXO will contract the remediation efforts through civilian explosive ordnance disposal contractors.

DESCRIPTION

Congress mandated the UXO Technology Demonstration Program. Advancements in unexploded ordnance (UXO) detection and discrimination technologies are necessary to support the operation, restoration, and transfer of the DoD's ranges. UXO characterization technologies can be affected by variations in site terrain, geology, natural or man-made materials, vegetative cover, and weather conditions encountered. The establishment of standardized UXO technology demonstration sites will allow users and developers to define the range of applicability of specific UXO technologies, gather data on sensor and system performance, compare results, and document realistic cost and performance information.

To satisfy both the research and development community and the technology demonstration community, the standardized sites comprise three areas, a Calibration Lane, a Blind Test Grid, and an Open Field Site. The Calibration Lane will allow demonstrators to test their equipment, build a site library, document signal strength, and deal with site-specific variables. The Blind Test Grid allows the demonstrator to operate the sensor system without platform, coordinate system, or operational concerns. The Open Field Site will document the performance of the entire system in simulated range conditions.

The program will also have a repository of standardized targets (munitions or calibration targets) that have the same model type, configuration, and relative magnetism to each other. These items are available for temporary loan for technology developers to build signature libraries of sensor-system performance under various conditions (i.e., soil, climate, geographic, vegetative). In addition, these targets are available to support geophysical prove-outs for the remediation of DoD facilities.

The program has also established standardized protocols for performing geophysical prove-outs. This is a guidance manual that outlines the process of site selection, site construction, test operations, demonstrators' data and field requirements, performance scoring, and site closure procedures. The Standardized UXO Technology Demonstration Site Protocols is a collaboration of several organizations and builds on the experience and expertise of each participant, to establish realistic and cost-effective standardized demonstration sites. These goals are defined and described in the protocols manual.

ACCOMPLISHMENTS AND RESULTS

Results from this program will be used across the United States to aid the development and use of sensor-system technologies for the detection and discrimination of buried UXO and the remediation of UXO sites.
Technology enhancements

FOLLOW-ON PROGRAM REQUIREMENTS

Technology application
Technology performance
Technology transfer
Identification of support to continue demonstration activities

PROGRAM PARTNERS

U.S. Army Environmental Center
U.S. Army Aberdeen Test Center
U.S. Army Corps of Engineers Engineer Research and Development Center
Environmental Security Technology Certification Program
Strategic Environmental Research & Development Program

LOW-COST HOT GAS DECONTAMINATION OF EXPLOSIVES-CONTAMINATED FIRING RANGE SCRAP

The Department of Defense (DoD) has numerous training, target, bombing, and firing ranges at active installations, Formerly Used Defense Sites (FUDS) and Base Realignment and Closure (BRAC) sites that have accumulated a substantial amount of contaminated scrap metal. Range sweeps generate piles of high-value recyclable scrap metal. Contrary to popular belief, many of these items still contain explosives residues after detonation. Explosive incidents involving scrap metal from training and firing ranges have occurred over the years.

PURPOSE

Use hot gas technology to achieve an analytically clean level (5X) for explosives-contaminated material by thermally desorbing and destroying the explosives.

BENEFITS

Hot gas technology has been demonstrated in the past as an effective technology for decontaminating explosives-contaminated materials. Application of this technology was limited to fixed facilities that were effective but expensive to operate. This application of the technology takes the decontamination process to the field where the scrap is located and decontaminates the scrap on site at a much cheaper price than at a fixed facility.

TECHNOLOGY USERS

All DoD installations, BRAC sites and FUDS sites can use this technology. The technology can be applied by installation personnel or can be contracted out.

DESCRIPTION

Hot gas technology is a proven technology that will achieve an analytically clean level (5X) for explosives-contaminated material, by thermally desorbing and destroying the explosives. All materials and equipment used in this process are off-the-shelf and readily available. Application of this process to piles of contaminated range scrap involves placing thermocouples in the pile, covering the pile with an insulating blanket, connecting a gas burner to the pile, heating the pile until all of the thermocouples reach the set temperature, and holding the temperature for a set period of time, usually four to six hours.

ACCOMPLISHMENTS AND RESULTS

The demonstration tests have been successful and the technical report is in review. The final report will be available in March 2003.

LIMITATIONS

This process cannot be used on unexploded ordnance or other items that are explosively configured in any way. It is not intended for use on combustible materials.

FOLLOW-ON PROGRAM REQUIREMENTS

Technology transfer to the services and interested users will be accomplished during 2004, by the U.S. Army Aberdeen Test Center.

PROGRAM PARTNERS

U.S. Army Environmental Center
Naval Ordnance Center, Indianhead
U.S. Army Aberdeen Test Center
Parsons Engineering Science

PUBLICATIONS

Design Guidance Manual for Low-Cost Disposable Hot Gas Decontamination System for Explosives-Contaminated Equipment and Facilities. November 1998. Parsons Engineering Science. SFIM-AEC-ET-CR-98046.

Demonstration Results of Hot Gas Decontamination for Explosives at Hawthorne Army Depot, Nevada. September 1995. Tennessee Valley Authority Environmental Research Center. SFIM-AEC-ET-CR-95031.

Hot Gas Decontamination of Explosives-Contaminated Items Process and Facility Conceptual Design. January 1995. Tennessee Valley Authority Environmental Research Center.SFIM-AEC-ET-CR-94118.

ADVANCED SMALL ARMS RANGE BEST MANAGEMENT PRACTICES GUIDANCE DOCUMENT

Metals such as zinc, copper, and lead that exist on small arms ranges can migrate from the range to adjacent water sources and pose a human health risk. Lead is of most concern because of the high quantities that accumulate on the range and its ability to persist in the environment. To continue operations of these ranges, the Army must obtain information on containing metals within the range and make this information accessible to range managers.

PURPOSE

To develop a small arms range best management practice guidance document that will allow range managers the ability to accurately determine if there is a risk potential of lead migration on the installation's ranges, and a step-by-step solution process for mitigating this potential risk.

BENEFITS

Range sustainability while protecting human health and the environment

TECHNOLOGY USERS

Installation range managers

DESCRIPTION

Fort Jackson has been selected as the demonstration site. The primary objective of this demonstration is to apply specific range maintenance techniques and technologies to an active small arms range and evaluate their effectiveness for possible inclusion in the best management practice guidance manual. This will be accomplished through various designs of structured bullet pocket enhancements, as well as range modifications and land rehabilitation efforts combined to serve as an overall improved method of storm water management. The specific goals of the range modifications are to reduce the overall potential for lead migration, reduce soil erosion, minimize bullet ricochet from impact berms, reduce range maintenance requirements, improve the ease of potential future lead recovery actions, and maintain the overall long-term sustainability of a small arms range.

Post-range modification monitoring will continue for nine months. Monitoring is expected to consist of monthly field inspections to gather information from automated monitoring equipment and to visually inspect the range for deterioration. Quarterly sampling to monitor lead distribution on the range will also occur.

A draft guidance manual will be developed to include a discussion of lead mobility on small-arms ranges; regulatory and logistical drivers for improved

range management practices; watershed assessment methodology, technology identification and selection methodology; technology performance assessment methods; technology economic cost analysis guidance; and potential funding sources for range environmental improvements.

ACCOMPLISHMENTS AND RESULTS

The program plan was completed and the assessment portion of the document was developed.

FOLLOW-ON PROGRAM REQUIREMENTS

- Collect data from Fort Jackson.
- Review data and select range sites for first implementation of range designs.
- Incorporate compliant range designs into standard Army designs.
- Revise and correct draft guidance manual as deemed necessary.

PROGRAM PARTNERS

U.S. Army Environmental Center
Aberdeen Test Center
Fort Jackson, South Carolina

RANGE DESIGN SPECIFICATIONS INCORPORATING ENVIRONMENTAL COMPLIANCE - EQT

Due to a significant growth in environmental regulations, Army ranges and training lands are increasingly being impacted by environmental compliance requirements that affect the use and capabilities of ranges. Existing range design elements that contribute to environmental degradation and regulatory noncompliance need to be identified, assessed, and improved designs developed, to mitigate future environmental degradation and potential regulatory noncompliance risk. This project analyzes range design elements with respect to mission, environmental degradation, and regulatory noncompliance. The project will develop new designs and provide retrofit and upgrade packages for selected high-risk elements. The long term operation and maintenance (O&M) requirements of existing designs, and their cost implications and impact on range downtime, also will be assessed.

PURPOSE

The overall purpose of this effort is to 1) identify range design elements that pose an environmental compliance risk, and develop improved range design elements to mitigate that risk; 2) to demonstrate, validate, and document selected new or improved range design elements; and 3) to incorporate recommended technologies into standard range design criteria.

BENEFITS

The new range design elements being developed under this program will mitigate future environmental degradation and potential regulatory noncompliance risk.

TECHNOLOGY USERS

All installations will be able to use the specifications, range retrofit packages, and design guides being developed under this program.

DESCRIPTION

Engineering aspects of the new designs will be assessed and compared to existing designs according to their cost, effectiveness, and O&M requirements over the range life cycle. Several design criteria include: 1) must meet acceptable tactical standards, 2) should achieve 50 percent reduction in O&M costs, 3) reduce berm maintenance time intervals to 20-36 months, 4) more effectively capture munitions, and 5) identify optimal berm composition and design methods.

Results of this effort will be new designs that incorporate sustainable components and reduce the risk of range operations. Products will be in the form of evaluation reports and design packages to be incorporated into existing standard range design processes. Evaluation reports and design packages will also be provided as general guidance for installation range managers so they can be used at the installation level for planning and modification of operations associated with existing ranges.

The approach is as follows. Existing environmental degradation and regulatory noncompliance data will be captured, along with design data relative to previous work on ranges. Design elements will then be assessed and prioritized based on readiness requirements and common environmental degradation problems and noncompliance risks. Finally, improved range design elements, siting criteria, and upgrade packages for existing ranges will be developed.

ACCOMPLISHMENTS AND RESULTS

The Construction Engineering Research Laboratory (CERL) is currently working to identify new major designs and design elements, for demonstration and validation purposes. The three major products associated with this effort are 1) a report documenting development of range design retrofit and upgrade packages, 2) a final report detailing improvements to existing range design elements, and 3) an engineering cost assessment. It is intended that a

minimum of five new major designs or design elements will be developed.

LIMITATIONS

Limitations of the new range design elements and guidelines currently being developed have not yet been determined.

FOLLOW-ON PROGRAM REQUIREMENTS

Demonstration and validation testing of selected range design elements will be performed beginning in late 2004/early 2005; technology transfer to interested users will likely be accomplished in 2006 by the U.S. Army Environmental Center. New and improved range design elements also must be incorporated into standard range design criteria, and commercialization assessments of promising technologies still must be performed.

PROGRAM PARTNERS

U.S. Army Environmental Center
U.S. Army Engineer Research and Engineering Laboratory, Cold Regions Research and Engineering Laboratory
U.S. Army Engineer Research and Engineering Laboratory, Construction Engineering Research Laboratory
Army Training Support Center

PUBLICATIONS

Design specifications for new or improved range design elements are being developed at this time.

TOOLS FOR MONITORING RANGE ACCESS - EQT

Increasing urban encroachment and the rise of international terrorism have resulted in an increased need for intrusion detection systems (IDS) on Army ranges. Minimizing unauthorized intrusion on Army ranges requires the detection and deterrence of intruders. This can be attempted on a range wide scale by lining the range perimeter with IDS sensors, and cameras, or on a local scale to protect specific sites on a range. Selection of security equipment depends on which approach is to be implemented, and on site-specific factors such as terrain, weather, and existing infrastructure. The success of either approach in preventing injury, damage, or theft will depend on the response time of military police once they have been alerted that an intruder has been detected. IDS technologies must 1) be cost effective and require minimum army personnel interaction, 2) must not impact training requirements, 3)

must be able to discriminate between human and animal intrusion, 4) must meet DoD and Army requirements for range access and control, and 5) must be incorporated into standard range design manuals and specifications.

PURPOSE

The overall purpose of this effort is to 1) identify, evaluate, and document existing government and commercial surveillance and monitoring technologies for their applicability to range access security; 2) provide tools that will aid installations in acquiring the needed protection; and 3) incorporate recommended technologies into standard range design criteria. The immediate goals are 1) develop and demonstrate IDS Decision Tree software, and 2) develop and demonstrate an IDS Geographic Information System line-of-sight software tool.

BENEFITS

This program will help ensure increased force protection levels, and will assist installations in the procurement and preliminary design of IDS. The tools currently being developed and demonstrated under this program will allow range managers to quickly select applicable IDS technologies from the wide array of technologies available, and will enable them to more easily estimate the number of IDS sensors required and the best location for these sensors.

TECHNOLOGY USERS

All installations can use the tools being developed; the tools can easily be applied by installation personnel provided the necessary computer hardware, software, and requisite GIS data are available.

DESCRIPTION

The IDS Decision Tree currently being developed will allow installation personnel to quickly identify the type of IDS best suited for their needs based on site-specific conditions. The Security GIS Tool being developed will assist users in placing cameras or line-of-sight IDS. The user will specify camera height, camera format and lens (both selected from menu) and whether the potential target is an upright or crawling person. The user will set a camera location and a target location by clicking the mouse. The tool will consider topography and vegetation in calculating view shed, and display effective camera coverage between camera and target as a green overlay on a site image. Blocked areas will be in red. The tool will allow the user to do 'what if' planning of camera placements.

ACCOMPLISHMENTS AND RESULTS

The Cold Regions Research and Engineering Laboratory (CRREL) has built an information database of IDS technologies and their capabilities and cost. CRREL has also invited demonstration of technologies for evaluation purposes, and evaluated technologies according to applicability to army range needs and requirements stated above. They have documented technologies that meet requirements. A report evaluating commercial and government

IDS that are applicable to ranges was published in September 2003. The report outlines options for detecting intrusion using commercial off-the-shelf (COTS) and government off-the-shelf (GOTS) equipment for both detection and surveillance assessment. It provides guidance to assist range managers in selecting IDS technologies best suited to their installation, and provides an evaluation of intrusion detection and surveillance equipment applicable to range applications. CRREL is currently developing the IDS Decision Tree and GIS Tool described above.

LIMITATIONS

The GIS tool currently being developed only will be applicable to cameras and line-of-sight IDS.

FOLLOW-ON PROGRAM REQUIREMENTS

Demonstration and validation testing of the IDS Decision Tree and GIS Tool will be performed in late 2004/early 2005; technology transfer to interested users will be accomplished in 2005 by the U.S. Army Environmental Center. IDS technology must be included in standard range design criteria, and commercialization assessments must be performed of promising technologies.

PROGRAM PARTNERS

U.S. Army Environmental Center
U.S. Army Engineer Research and Engineering Laboratory, Cold Regions Research and Engineering Laboratory
U.S. Army Engineer Research and Engineering Laboratory, Construction Engineering Research Laboratory
Army Training Support Center

PUBLICATIONS

Technology for Range Security. September 2003. US Army Engineer Research and Engineering Laboratory, Cold Regions Research and Engineering Laboratory (CRREL).

RANGE MUNITIONS CARRYING CAPACITY MODEL OR ATTACC FOR MUNITIONS (AFM) - EQT

Due to a significant growth in environmental regulations, Army ranges and training lands are increasingly being impacted by a diverse set of environmental compliance requirements that affect the use and capabilities of ranges. Characterization of environmental risk associated with munitions use on ranges is required to sustain mission operations on ranges. Range managers and planners must understand the current environmental risks, and be able to assess future environmental risks as a function of munitions use. The ability to project risk as a function of planned range use is critical since it impacts documentation, justification, budgeting, and scheduling of range projects. Assessment of environmental risk to ranges from ongoing and future training and testing activities can be met through development of a munitions management and prediction tool.

PURPOSE

The purpose of this effort is to develop a munitions-based carrying capacity capability for ranges that is similar to the existing Army Training and Testing Area Carrying Capacity (ATTACC) methodology addressing maneuver impacts on ranges. Another objective is to integrate the model with ITAM ATTACC methodology, so as to develop a capability to model the cumulative effects of range operations.

BENEFITS

The model being developed under this program will enable range managers and planners to better assess current environmental risks and future environmental risks as a function of munitions use. In addition to being able to project risk as a function of planned range use, the tool will enable range managers to improve budgeting and scheduling of range projects.

TECHNOLOGY USERS

All installations will be able to use the AFM model being developed under this program.

DESCRIPTION

The product of this effort will be a munitions carrying capacity methodology that is able to predict the munitions carrying capacity of a range, as a function of munitions type and quantity, and existing environmental conditions associated with that range. Range use will be characterized using existing military data repositories, programs, and computer methods such as ATTACC, and the Range Facility Management Support System (RFMSS). Munitions use will be defined by STRAC requirements. Environmental condition of ranges will be based upon active and inactive range inventories, and related environmental data sources. The potential effects of proposed range use activities would be

predicted using existing munitions fate, effects, and transport models. The development approach is as follows. Initially, all available information related to munitions activity on ranges, and the potential for contamination of ranges, will be captured. The next step will be to develop a methodology to capture munitions use data and translate that information into potential effects based on case studies and existing munitions effects, fate, and transport models. A test case model incorporating techniques to collect information and predict outcome will then be developed for an installation. Finally, the technical validity of the model will be reviewed, and appropriate modifications made to accomplish integration with RFMSS and ATTACC process and methodologies. Stated more simply, to incorporate munitions activities into the ATTACC methodology, three components must be developed as follows: 1) a munitions training load component, 2) a land condition measurement component, and 3) a relationship between land condition and munitions training load.

ACCOMPLISHMENTS AND RESULTS

The Construction Engineering Research Laboratory (CERL) recently completed the first phase (as described above) of developing an ATTACC-like range munitions training load quantification methodology – the training load characterization. Development of the land condition measure component, and land condition/munitions training load relationship methodology is ongoing.

LIMITATIONS

The AFM model will initially be applicable only to training ranges.

FOLLOW-ON PROGRAM REQUIREMENTS

Demonstration and validation of the model will likely be performed beginning in late 2004/early 2005; technology transfer to interested users will likely be accomplished in 2005 by the U.S. Army Environmental Center.

PROGRAM PARTNERS

U.S. Army Environmental Center
U.S. Army Engineer Research and Engineering Laboratory, Construction Engineering Research Laboratory
Army Training Support Center

PUBLICATIONS

ATTACC-Like Range Munitions Training Load Quantification Methodology – Phase I, Final Report, dated April 20, 2004, CALIBRE with the Construction Engineering Research Laboratory

RANGE DESIGN RISK ASSESSMENT MODEL - EQT

Because of a significant growth in environmental regulations, Army ranges and training lands are increasingly being impacted by environmental compliance requirements that affect the use and capabilities of ranges. A tool is required that permits early identification of environmental compliance issues affecting the design, construction, operation, maintenance, and closure of ranges. The product of this effort is to be a Range Risk Assessment Model.

PURPOSE

The purpose of this effort is to develop a matrix methodology that identifies environmental compliance issues and other risk factors related to sustainable ranges, and that assists range managers in planning for and designing new ranges and retrofitting existing ranges.

BENEFITS

The model being developed under this program will enable range managers and planners to more quickly identify and assess environmental compliance issues and other risk factors related to sustainable ranges. The model will also help in the planning and designing of new ranges, and retrofitting existing ranges. This will favorably impact budgeting and scheduling of range projects.

TECHNOLOGY USERS

All installations will be able to use the Range Risk Assessment Model being developed under this program.

DESCRIPTION

The product of this effort is a tool that will provide for early identification of environmental compliance issues that affect the design, construction, operation, maintenance, and closure of ranges. It will enable range managers to focus time and resources, shorten the NEPA process, and reduce overall costs. The tool will walk users through the environmental issues and risks related to range projects, as well as support the NEPA process. The tool will support assessment of existing ranges and construction of new ranges. The tool will be computer-based with a graphical user interface. It will have reference links to the Environmental Performance Assessment System (EPAS), Range Munitions User Guide, and Web-based links to environmental modeling tools. Users will include all personnel that have a role in the planning, design, construction, operation, maintenance, and closure of ranges.

The research and development (R&D) phase has three elements, as follows: 1) develop a range environmental risk methodology, 2) qualify or quantify environmental compliance risk for individual ranges or a suite of range types, and 3) identify and incorporate into the model appropriate mitigation approaches and techniques to address risk. Risk will be assessed in terms of significant environmental compliance risks now, or future risks anticipated to

be associated with sustaining ranges and training activities.
The model will be developed in three phases, with each phase representing an interim product. The first phase will be a computer-based tool with an initial assessment methodology. This will provide an automated matrix that scores the probability of environmental compliance vulnerability for ranges. The second phase product will expand the analysis capability to include spatially explicit analysis of regional and site-specific issues. The third phase product will include a numerical modeling capability that may be applied to site-specific factors.

ACCOMPLISHMENTS AND RESULTS

The Construction Engineering Research Laboratory (CERL) recently completed the first phase, as described above.

LIMITATIONS

This model is intended to be a tool to assist range managers; however, since environmental regulations are typically in a state of flux, with new regulations being added and existing regulations being amended, range managers should not rely solely on this tool, and will still need to consult with installation environmental personnel.

FOLLOW-ON PROGRAM REQUIREMENTS

Demonstration and validation of the model will likely be performed beginning in late 2004/early 2005; technology transfer to interested users will likely be accomplished in 2005 by the U.S. Army Environmental Center.

PROGRAM PARTNERS

U.S. Army Environmental Center
U.S. Army Engineer Research and Engineering Laboratory, Construction Engineering Research Laboratory
Army Training Support Center

PUBLICATIONS

Being developed.

VEGETATION WEAR TOLERANCE

Erosion can affect the quality of training sites and the environment on Army installations. Revegetating eroded areas with species able to tolerate heavy vehicle and troop traffic will reduce erosion, keep lands open for training and maneuvers, and save time and money.

PURPOSE

To demonstrate the effectiveness of new types of plants for northern desert climates; to tolerate wear and prevent erosion from troop and vehicle traffic on individual installations.

BENEFITS

Revegetating eroded areas with species able to tolerate heavy vehicle and troop traffic will reduce erosion, keep lands open to training and maneuvers, and save precious time and funding. Northern desert regions are particularly susceptible to erosion and wear from tactical vehicle traffic.

TECHNOLOGY USERS

Installation range and natural resource managers

DESCRIPTION

Demonstrations will compare resiliency of new plants by comparing the improved plants to plant mixtures traditionally used at the facility. The evaluation is being conducted at two western training facilities – Yakima Training Center (Washington) and Camp Guernsey (Wyoming). Planting at the two facilities took place in 2002 and 2003. Some delays occurred in 2002 due to drought conditions.

Researchers will monitor these demonstration sites for three years. The demonstrations will involve controlled troop and vehicle traffic, submitting the plants to diverse levels of wear. Based on the test results, certain species will be recommended for installations with similar soil and climate conditions. Information on these species will be available on the VegSpec computer program, so natural resource and range managers can easily identify and select the plants best suited for their revegetation needs.

Researchers are conducting this demonstration in cooperation with the Environmental Technology Certification Program (ESTCP).

ACCOMPLISHMENTS AND RESULTS

The project planting has been completed. Data is being collected with regard to soil compaction, numbers of plants, plant heights, etc., at both field sites.

FOLLOW-ON PROGRAM REQUIREMENTS

- **Monitor project; make sure vehicle and foot traffic is applied according to the project plan.**
- **Record results, summarize data, prepare technical report, and publish results.**

PROGRAM PARTNERS

Environmental Technology Certification Program

ORDNANCE EMISSIONS CHARACTERIZATION PROGRAM

Military installations need to characterize the emissions generated by munitions during training and testing activities. The Ordnance Emissions Characterization Program will provide the Army and Defense Department with data to help them assess the environmental impacts from munitions use, as well as to build various models and health and risk assessments.

PURPOSE

- **To obtain data and identify models that quantify the emissions generated from munition items.**
- **To provide the U.S. Army with data to assess potential air emissions.**
- **To create defensible data to be used for fate, transport, and effect work.**

BENEFITS

The data generated from this effort will help the Army and Army installations assess the environmental impacts of using munitions during training and testing operations. The emissions data can be used to feed various models (such as air, fate, and transport) and support the generation of health risk assessments. Installations can also use the data to meet the Emergency Planning and Community Right-to-Know Act or the Toxic Release Inventory reporting requirements. Environmental restrictions on training U.S. military personnel will be minimized, due to more scientific data. Future cleanup costs may be reduced. Furthermore, the environmental stewardship shown will enhance both public image and trust.

TECHNOLOGY USERS

Army and Department of Defense installations
U.S. Army Installations

U.S. Army Research Laboratory
U.S. Army Corps of Engineers – Waterways Experiment Station
National Guard Bureau

DESCRIPTION

The U.S. Army Environmental Center (USAEC) has developed a test program to identify and quantify the emissions that result from weapons firing and from the use of pyrotechnic devices. The data to be gathered will provide information on the concentrations of the emission products. The requirement for this information was identified as a result of the Administrative Orders issued by the Environmental Protection Agency (EPA) Region I, which severely restricted training operations at the Massachusetts Military Reservation. The Army questioned the validity of the claims made by the EPA Region I, but was unable to provide data regarding training range emissions and the fate and transport of those emissions in the environment. This test program is focused on obtaining and developing data, such that the Army will be able a present an incontrovertible case for the continuation of operations, or at least limit the breadth of restrictions to those activities that are in fact causing peril. The three distinct but related project areas to quantify emissions have been developed as follows:

1) Firing Point Emission Study

This effort will develop data on the emissions resulting from weapons firing at the firing position and associated emissions factors. The focus of the effort will be to quantify the emissions, develop emissions factors and evaluate the fate of emissions from representative U.S. Army weapon system ammunition classes. The data generated will support the U.S. Army and U.S. Army installations in assessing the environmental impact of weapons firing as a part of training and testing operations. Limited data exist on the emissions associated with weapons firing. Research efforts such as those conducted by IIT Research Institute on small caliber (5.56 millimeter) and large caliber (105 mm) were very limited in scope. A phased approach has been developed. Phase I will encompass a data search and analysis, test matrix and methodology development, model development, and an interim report. An important objective of Phase I will be to establish item similarities and data crossover so that the item test matrix and costs are minimized. Phase I was completed in October 1998. Phase II involves actual weapons firing at the Aberdeen Test Center, Aberdeen Proving Ground, Maryland, with sampling and analysis results used to develop emission factors for specific weapons systems and ammunition types.

2) Characterization of Smoke and Pyrotechnic Emissions

This effort will develop data on the emissions resulting from smoke grenades and flare use during training and testing. A phased approach will be used to accomplish this task. Phase I encompasses a comprehensive data search

followed by actual testing to develop data on the emissions resulting from smoke grenade and flare use. The emissions will be characterized in the Bang Box at the Dugway Proving Ground, Utah, for various smoke grenades (colored and uncolored) and flare devices (colored and uncolored). Results of these characterization efforts will be used to generate emission factors for the various items. The emission factors then can be used in conjunction with standard dispersion models to estimate downwind concentrations and rates of deposition.

3) Exploding Ordnance Emissions

This effort identifies and evaluates the fate of explosive compounds in projectiles that have properly functioned during training and testing operations. Efforts will be focused to assess and document the completeness of reaction, and to quantify the emission residuals and byproducts from explosive detonation of military projectiles. The dispersal of the residuals and byproducts in air, soil, and water will be evaluated, as well as factors affecting their environmental degradation and transport. A phased approach is planned. Phase I efforts will consist of a significant data search and review, test matrix and methodology development, and model identification. One aspect of test methodology will be to assess the potential of using small-scale detonations that mimic much larger sized ordnance. It is envisioned that at least one full-scale detonation will be required, and those results will be used for verification of the test methodology. Phase II will provide for the actual testing and for the development of emission factors.

Phase III for all studies in this effort involves a comprehensive study on the environmental fate and transport of the emission products in the environment.

For all of the emissions studies, it is known that in perfect combustion of an organic (carbon-containing) substance, only carbon dioxide and water are created. However, because explosions and other types of combustion do not always take place under optimum conditions, and because there are other substances included in these items, researchers look for many other substances in addition to carbon dioxide and water. During testing, the item being evaluated is placed in the testing chamber, and the system used to collect the emissions from the ignition of the item is activated. Upon detonation, the emission products are collected through a vacuum system. The samples collected are then processed by chemists to determine amounts of any substances present. Chemists analyze the samples collected for over 280 different substances that can be byproducts of any combustion. The airborne compounds sampled during these tests included total suspended particulate, particulate matter that was smaller than 10 microns and 2.5 microns, metals, volatile organic compounds, dioxins and furans, carbon monoxide, and similar compounds that might lead to public health concerns.

ACCOMPLISHMENTS AND RESULTS

The tests were also videotaped with high-speed film, enabling researchers to play back the video and measure the fire plumes and smoke patterns from the detonations. The temperature and velocity of the firing are also being measured. The information obtained can be used by modelers to determine what is ultimately happening to the emissions and their effects, if any.

Testing of 125 items for emissions characterization was completed. Reports are being generated recording emission factors, actual concentrations, and analysis of emissions.

Forty health risk assessments and fact sheets have been produced based on the emission factors generated.

The EPA-Research Triangle Park (EPA-RTP) has been reviewing detailed test plans prior to the firing or detonating of the ordnance. EPA-RTP's comments and approval of the plans has added great validity to the testing.

FOLLOW-ON PROGRAM REQUIREMENTS

- **Complete 45 various tests in fiscal year 2004 at Dugway Proving Ground and the U.S. Army Aberdeen Test Center.**
- **Complete documents publishing emission factor results.**
- **Publish emission factors in the EPA's standard document (AP-42).**
- **Publish fact sheets and technical documents for each item tested (with descriptions of the item, its emissions and a generic health risk assessment).**

PROGRAM PARTNERS

U.S. Army Environmental Center
U.S. Army Aberdeen Test Center
U.S. Army West Deseret Test Center, Dugway Proving Ground
Environmental Protection Agency
U.S. Army Center for Health Promotion and Preventive Medicine

EMISSION SOURCE MODELING AND HEALTH RISK ASSESSMENT

When conducting site-specific evaluations of munitions emissions, installations may request guidance in gathering pertinent data. A handbook that details the types of modeling information necessary to perform site-specific assessments would be helpful. USAEC has been characterizing ordnance emissions; these emissions can be used to feed air-dispersion models. After modeling is completed, those numbers can be compared with health risk assessment toxicity levels to determine whether there is a potential health risk from the use of those munition items at the installation.

PURPOSE

Develop a handbook to be used by an installation to collect pertinent data for performing site-specific evaluations and health risk assessments. This handbook is not intended to be used as a guide for conducting site-specific modeling; instead, it identifies the information that would be needed if such an analysis were desired. Specifically, the handbook includes a general overview of the selected model; identifies parameters (e.g., wind speed) that are needed to perform a site-specific evaluation; and provides sources where information may be obtained, if applicable. Recommendations on possible modifications to make the model more applicable for Army use also may be included as appropriate (e.g., ability to use item-specific emissions data).

BENEFITS

Installation-specific health risk assessment for the use of munitions.

TECHNOLOGY USERS

Installation personnel
Air modelers

DESCRIPTION

Identifies needs and provides estimated hours and costs to perform site-specific assessments of munitions emissions and associated risks, if any.

ACCOMPLISHMENTS AND RESULTS

Final handbook is available for installation use.

LIMITATIONS

Air models are not capable of modeling different point sources.

FOLLOW-ON PROGRAM REQUIREMENTS

Validation is required at the installation level.

PROGRAM PARTNERS

U.S. Army Center for Health Promotion and Preventive Medicine
Environmental Protection Agency

EMISSION SOURCE CHARACTERIZATION MODEL (SCM)

Existing models for predicting emissions and transport from munitions detonation and burning do not make use of the measured emissions data for firing point (FP), exploding ordnance (EO), and smoke/pyrotechnics (SP) gathered from the testing at Dugway Proving Ground (DPG) and the Aberdeen Test Center (ATC). As a result, current models have difficulty predicting volatile and semi-volatile emissions accurately. The U.S. Army Environmental Center (USAEC) has teamed with Aerodyne Research, Inc. and has received Strategic Environmental Research and Development Program (SERDP) funding (1) to improve the modeling of chemical emissions fate from munitions testing, use, and demil by collecting, evaluating, warehousing, and publishing modeling source terms, and (2) to use the source terms in an existing model. This project will not generate data but will use data generated by emissions testing and similar efforts at USAEC, from elsewhere within the Department of Defense (DoD), and from other databases. The source term data will be customized to a particular model but will also be available to any modelers upon request. The EPA (Office of Air Quality Planning and Standards, at Research Triangle Park) is a technical advisor for this effort to ensure the model will be accepted for use upon completion.

PURPOSE

The goals of the SCM are to understand and quantify the major chemical and physical processes in FP, EO, and SP munition items when they function properly; develop an SCM for accurately predicting source terms resulting from the detonation of munitions, link the SCM output to appropriate fate and transport models, and validate the final transport SCM against real-world scenarios. The SCM will also serve as a model to bridge a data gap between available emission data obtained from actual munition testing to those munition items that were not able to be tested. The SCM will allow modelers to determine what the levels of emissions are from various munition items with some level of certainty. USAEC has tested and collected emission factor data for over 140 FP, EO, and SP munition items as part of the Munitions Air Emissions Characterization Program to date, and is expected to test a total of 223 by the time testing is completed. However, the Army currently has over 13,000 munition items in use. The SCM will serve as a model to fill in the data gap between available emission data obtained from actual munition testing to those munition items that could not be tested.

BENEFITS

The SCM will allow DoD to have a predictive tool for emissions factor data from munitions where real-world data may not be available.

TECHNOLOGY USERS

Installation personnel
Air modelers

DESCRIPTION

The SCM will allow modelers to determine what the levels of emissions are from various munition items, with some level of certainty.

ACCOMPLISHMENTS AND RESULTS

The beta version of model is available for use.

LIMITATIONS

The model currently has data from 14 emissions events. Further validation will be required to ensure all emissions are accurately calculated.

FOLLOW-ON PROGRAM REQUIREMENTS

Validation of the model using all 223 munitions to be quantified.

PROGRAM PARTNERS

Aerodyne Research Inc.
Strategic Environmental Research and Development Program
Environmental Protection Agency

EMISSIONS HEALTH RISK ASSESSMENT AND FACT SHEET DEVELOPMENT

This project defines the on-going effort by the U.S. Army Environmental Center (USAEC) and the U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) Environmental Health Risk Assessment Program (EHRAP) to evaluate potential risks to off-site residents who live near Army training facilities.

PURPOSE

Health Risk Assessments provide potential human health effects for off-site residents living near Army training facilities. All available data is used in an air model to provide chemical-specific air concentrations. The air model is first run by assuming that a hypothetical person resides at a point 100 meters downwind from the source of the air emissions, unless there is documentation indicating other restrictions on residential locations exist. These air concentrations are then time adjusted and compared with health-based screening levels. If the initial assessment shows that potential health impacts exist, the distance is increased and the assessment reevaluated until

the ambient air concentrations are below the health-based screening levels. In most cases, the distance to the nearest resident is at least 1,000 meters away. However, the study conservatively uses a distance of 100 meters as a first step.

BENEFITS

Potential risks to off-site residents who live near Army training facilities are determined using real-world emissions factor data obtained from testing. Through conducting the Health Risk Assessments, it has been determined that there is minimal, if any, potential inhalation risk to off-site residents.

TECHNOLOGY USERS

Installation personnel
Air modelers
Risk Assessors

DESCRIPTION

These assessments determine potential human health effects to off-site residents breathing air emissions from munitions used during training activities on Army installations.

ACCOMPLISHMENTS AND RESULTS

More than 40 Health Risk Assessments and fact sheets are available and it is anticipated that 223 will be available in the next two years.

LIMITATIONS

The evaluation is limited to the assessment of potential health risks from inhalation of air emissions that are released upon the use of training munitions. Each munition is evaluated separately with a typical use scenario provided. Also, since these studies are not modeled after any one existing training facility, conservative model input data is used so that the results are generic enough to be applicable to most facilities using these munitions.

PROGRAM PARTNERS

U.S. Army Center for Health Promotion and Preventive Medicine
Environmental Protection Agency

UXO TECHNOLOGY DEMONSTRATION PROGRAM - NDCEE

The UXO 2001 Report to Congress estimates that over 11 million acres in the U.S. may be contaminated with unexploded ordnance (UXO). This includes approximately 763 Formerly Used Defense Sites (FUDS) that must be cleared of UXO by DoD for civilian use and 23 Base Realignment and Closure (BRAC) installations that must be cleared of UXO for reuse, and others requiring restricted access. A mixture of political, regulatory, present technology limitations, and budgetary drivers forces the need to improve the Army's ability to remediate UXO sites.

PURPOSE

The purpose of this program is to more fully document UXO issues involved in closure and turnover of BRAC installations.

BENEFITS

This program provides support to the research and development community efforts to improve the capabilities and limitations of sensor technology's ability to detect, discriminate, and remediate UXO-contaminated sites.

TECHNOLOGY USERS

The products from this program will support the UXO technology research and development community and ultimately military installations with sites that contain UXO.

DESCRIPTION

The FY02 program will 1) document state-of-the-art UXO neutralization and remediation technologies and identify data gaps to enable the Army to better focus and direct future UXO research, development, test, and evaluation efforts; 2) increase understanding of UXO movement through subsurface soil due to natural thermal cycling effects; 3) assess electromagnetic induction (EMI) effects on electronic fuses; 4) assess munitions corrosion susceptibility; 5) evaluate land use controls for UXO sites; and 6) develop quality control protocols for UXO technology operators.

The FY03 program will 1) assess the extent of shallow water ranges; 2) survey and document the geology, water, vegetation, and other relevant factors at the UXO sites; 3) develop a dual mode navigation tool; 4) conduct a field demonstration of the electronic data collection process for the UXO recovery database; 5) support environmental chamber migration testing; 6) assess munitions design and type and rate of corrosion influences on the corrosion susceptibility; 7) assess the ordnance dud rates versus environmental factors; 8) investigate enhanced munitions detectability; 9) collect data for a dud and low-order rate study; 10) assess the extent of dud problems associated with avalanche control; and 11) develop a time and cost trade-off tool for UXO remediation efforts.

ACCOMPLISHMENTS AND RESULTS

Results from this program will support research and development efforts across the U.S. to aid in the development of technologies and protocols for the remediation of UXO sites.

FOLLOW-ON PROGRAM REQUIREMENTS

Contingent on congressional funding support

PROGRAM PARTNERS

U.S. Army Environmental Center
U.S. Navy Explosive Ordnance Disposal Technology Division
U.S. Army Aberdeen Test Center
U.S. Army Corps of Engineers Engineer Research and Development Center
Environmental Security Technology Certification Program
Strategic Environmental Research & Development Program
U.S. Air Force Robotics Laboratory
U.S. Army Corps of Engineers, Huntsville, AL
U.S. Army Corps of Engineers Waterways Experimental Station
Department of Defense Explosives Safety Board
U.S. Air Force Research Lab
U.S. Navy NFESC
JUXOCO

PUBLICATIONS

- **Subtask 2: UXO Neutralization Technologies Technical Report.**
- **Subtask 4: UXO Recovery Database Technical Report.**
- **The Army Environmental Quality Technology Program Operating Principles of October 2001.**
- **Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3170.01B 15 April 2001.**
- **Army Regulation 71-9 Requirements Generation.**
- **Department of Defense Directive (DODD) 5000.1 2002.**
- **MIL-STD-331B (Military Standard Fuses and Fuse Components).**
- **UXO Multi-service Procedures for Operations in an Unexploded Ordnance**
- **Environment, FM 100-38/MCRP 4-5/WP TP 3-02.4.1 ACCPAM 10-752/PACAFPAM 10-752/USAFEPAM 10-752, July 1996.**

UXO TECHNOLOGY DEMONSTRATION PROGRAM - EQT

The UXO 2001 Report to Congress estimates that over 11 million acres in the U.S. may be contaminated with unexploded ordnance (UXO). This includes approximately 763 Formerly Used Defense Sites (FUDS), which must be cleared of UXO by DoD for civilian use, 23 Base Realignment and Closure (BRAC) installations which must be cleared of UXO for reuse, and others requiring restricted access. A mixture of political, regulatory, present technology limitations, and budgetary drivers forces the need to improve the Army's ability to remediate UXO-contaminated sites. The screening, detection, and discrimination of UXO at closed, transferring, and transferred ranges is the Army's highest priority environmental restoration requirement.

PURPOSE

The purpose of this program is to take a multi-tiered approach to improve the current state of technology and arrive at reliable and cost-effective solutions to the UXO screening, detection, and discrimination problem.

BENEFITS

The Army's Environmental Quality Technology (EQT) program focuses specifically on ground-based and shallow water UXO detection and discrimination technologies. The EQT program managers and researchers are actively involved in the DoD's Strategic Environmental Research and Development Program (SERDP) and Environmental Security Technology Certification Program (ESTCP)-funded UXO-related projects, and applicable results from these programs will be leveraged to the fullest extent.

Many of the underlying science and engineering principles associated with the detection and discrimination of UXO as it relates to environmental restoration are similar to those associated with the countermine, explosive ordnance disposal, active range clearance, and humanitarian demining mission areas. Research, development, test, and evaluation (RDT&E) activities addressing these mission areas are coordinated through the Joint UXO Coordination Office. The EQT program managers are cognizant of the ongoing activities in related mission areas and will ensure conservation of RDT&E resources by coordinating across mission areas as appropriate and leveraging RDT&E conducted in other mission areas where possible to meet UXO remediation needs.

TECHNOLOGY USERS

The technologies will be, for the most part, used by private industries providing UXO remediation services to the DoD. The technologies will need regulatory and user acceptance to ensure that the technology, if properly implemented, will meet established performance metrics. Therefore, within this program, regulatory concerns, buy-in, and input will be sought and incorporated.

DESCRIPTION

Current technology cannot effectively or efficiently cover large tracts of land and wide areas under all weather and geophysical conditions for the purpose of screening and identifying areas that potentially contain UXO. The lack of efficient wide-area characterization technologies makes site-specific planning and remediation difficult. The Army EQT program will rely on ESTCP/ SERDP programs to advance the state of the art in wide-area survey and will develop advanced sensing, analysis, and positioning technologies that could transition to airborne platforms.

ACCOMPLISHMENTS AND RESULTS

The program performance metrics are based on testing to be conducted at the Standardized UXO Technology Demonstration Sites. The Standardized UXO Technology Demonstration Sites are found at Aberdeen Proving Ground and Yuma Proving Ground. Descriptions, standardized procedures, and protocols are clearly established in the Standardized UXO Technology Demonstration Site Program Protocols, January 2002. This was a decision based on the need for absolute levels in the exit criteria. The only approach to ensure repeatable testing and realistic test scenarios is to use standardized sites, because of the known ground truth and the stability of the sites. Additional demonstrations will be conducted at live sites to be established through the EQT program, to ensure a correlation between the validated capabilities at the live sites and the standardized sites.

The technologies developed and demonstrated under this program shall be required to operate in a wide range of environments, where ambient temperatures may range from -30 to +50 deg. C and relative humidity can reach 99 percent. The systems must be capable of operating in the vicinity of power lines and other sources of electromagnetic interference. In addition, ground-based systems must be water resistant to allow operation during rain or snow conditions. Systems shall have sufficient battery and data storage capacity to allow for five hours of continuous operation without recharging or downloading.

FOLLOW-ON PROGRAM REQUIREMENTS

To be determined

PROGRAM PARTNERS

U.S. Army Environmental Center
U.S. Army Corps of Engineers Engineer Research and Development Center
U.S. Army Corps of Engineers, Engineering and Support Center

PUBLICATIONS

Standardized UXO Technology Demonstration Site Program Protocols, January 2002.

The Army Environmental Quality Technology Program A (1.6.a) UXO Screening, Detection, and Discrimination Management Plan, April 2002.

The Army Environmental Quality Technology Program A (1.6.a) UXO Screening, Detection, and Discrimination AERTA Requirement, July 1999.

FIFTH ENVIRONMENTAL TECHNOLOGY SYMPOSIUM & WORKSHOP

In this age of decreasing funds, it is important for military services, state organizations, and industry to leverage available resources and information. The Environmental Technology Symposium and Workshop provides such an opportunity. The symposium is a forum for technical exchange and interaction on environmental technology strategies, initiatives, demonstrations, and products. Tri-Services and the Interstate Technology Regulatory Council (ITRC) jointly hosted the symposium.

PURPOSE

To provide a forum for technical exchange and interaction on environmental technology strategies, initiatives, demonstrations, and products.

BENEFITS

By combining efforts with the Navy and Air Force, and the ITRC, the Army reduces its funding needs for the symposium's total cost. The symposium also helps disseminate information across the services, reducing the "reinventing the wheel" syndrome. Combining what could be three conferences into one also reduces personnel travel expenses and time away from the office.

TECHNOLOGY USERS

Department of Defense (DoD) installations

DESCRIPTION

In 1995, the U.S. Army Environmental Center (USAEC) hosted the DoD Environmental Technology Workshop. Bringing together the three military environmental support centers, this venue offered the opportunity for a unified position on environmental technology. The services recognize the need to share information. Since then, the Tri-Service Environmental Support Centers Coordinating Committee has supported the prior Tri-Service Environmental Technology Workshops and ITRC joined us in improving our venue to include state and federal regulatory partnerships, guidance

documents, and training sessions. This most recent symposium also will host the Third annual Environmental Quality Technology (EQT) Workshop, which will offer Technology Team Breakouts and examine FY03 initiatives.

The three services and ITRC comprise the organizational committee, where USAEC remained as the chair. The committee's main role was to review and select abstracts for platform presentation; it performs other functions as necessary. The USAEC and the support contractor, TRI, handle the balance of the effort.

Symposium presentations focused on mature technologies of timely interest to participants. Emphasis was placed on technologies that are "field ready," and are currently being demonstrated, or have already been demonstrated.

ACCOMPLISHMENTS AND RESULTS

The 2001 Tri-Service Environmental Technology Symposium was held 18-20 June 2001 in San Diego, California. The symposium attracted over 300 attendees and included 46 exhibitors, 54 platform presentations, and 30 posters. The 2003 Environmental Technology Symposium was held March 24-28 in Charlotte, North Carolina. By the event's end, there were 468 attendees, and more than 35 exhibitors.

FOLLOW-ON PROGRAM REQUIREMENTS

The 6th Tri-Service Environmental Technology Symposium is currently in the concept-design stage. The goal is to hold the 6th Tri-Service Environmental Technology Symposium during FY 2005 in a Western United States location.

PROGRAM PARTNERS

U.S. Army Environmental Center
Office of the Director of Environmental Programs
Naval Facilities Engineering Service Center
Air Force Center for Environmental Excellence
Interstate Technology Regulatory Council

PUBLICATIONS

Proceedings from 1996 workshop. SFIM-AEC-ET-CR-96187.
Proceedings from 1997 workshop. SFIM-AEC-ET-CR-9705.
Proceedings from 1998 workshop available at www.aec.army.mil/.
Proceedings from the 2001 symposium.

U.S. ARMY ENVIRONMENTAL (USER) REQUIREMENTS AND TECHNOLOGY ASSESSMENTS

During the first 15 years of Army environmental research, most Research, Development, Test, and Evaluation (RDT&E) goals and objectives were established through informal coordination within the Army development community. Given greater emphasis on relevance to Army users, a more rigorous, requirements-based approach was developed in the early 1990s. Since 1993, the environmental user requirements process has been formalized into a two-year cycle aligned with the Program Objective Memorandum process.

PURPOSE

U.S. Army Environmental (User) Requirements and Technology Assessments (AERTA) serves as the Headquarters Army central repository for environmental user requirements and related information in support of the Army's Environmental Quality Technology (EQT) Program. AERTA facilitates Army's validated and prioritized environmental user requirements to help the RDT&E community identify opportunities for developing and demonstrating improved environmental systems and identify applicable off-the-shelf technologies to help Army users make informed decisions on technologies that are better, faster, and more cost-effective.

BENEFITS

In addition to satisfying the annual Department of Defense (DoD) tri-service reporting requirement to the Environmental Security Technology Requirements Group (ESTRG), the AERTA process enhances communication between the "users" of environmental technologies and the Army's environmental RDT&E community. It gives the RDT&E community a better understanding of users' environmental technology requirements with associated performance metrics, their priorities, and the Army's cost of living with the problem, all of which provide the basis for developing RDT&E environmental technology management plans. AERTA provides Army installations with information on the development and availability of faster and more cost-effective environmental technologies. Organizations with technology requirements can use AERTA to identify and share "lessons learned" in a time of shrinking resources.

TECHNOLOGY USERS

Army and DoD major commands and installations use technologies to satisfy their environmental requirements. The AERTA Web site documents technology needs from four user communities: (1) users responsible for installation infrastructure; (2) users responsible for weapons systems acquisition; (3) major commands that use these weapons systems; and (4) agencies responsible for collecting and tracking needs related to infrastructure and weapons systems.

DESCRIPTION

The initial database contained approximately 200 environmentally related operational problems throughout the Army. These were screened to focus on those requiring long-term research and development. These were then prioritized based on six ranking criteria: (1) environmental impact, (2) impact on readiness, (3) annual cost of operating with the unresolved requirement, (4) extent of the problem throughout the Army, (5) impact on quality of life, and (6) regulatory time limits.

The Office of the Assistant Chief of Staff for Installation Management (ACSIM), through the U.S. Army Environmental Center (USAEC), refined and updated these requirements from 1995 through 1997, expanding the scope of the effort into the Technology User Needs Survey (TNS). The Army's environmental databases were analyzed to maximize existing user environmental reporting, and several site visits were conducted across Army installations and major commands. These actions refined the qualitative and quantitative data on user needs and allowed requirements to be compiled in a common format that supports the DoD Tri-Service Environmental Quality Requirements Strategy (prepared by ESTRG). The updated requirements were presented at technology team meetings in 1996 and 1997 for review and validation. The list was narrowed to 142 requirements in 1997 and further focused to 44 requirements in 1999, which were prioritized within each program area (i.e., pillar) by the user community.

The TNS was retailored as a database, configured for Internet access, and was renamed AERTA. AERTA is a database that is kept current through the Army's EQT and ACSIM's user-requirements process and schedule. Army EQT adopted the recent changes to the Chairman, Joint Chiefs of Staff Instruction that defines the process for identifying capabilities. AERTA is being revised to meet the new reporting format of the Joint Capabilities Integration and Development System (JCIDS) by the end of FY 2004. The conversion of AERTA to JCIDS process and format began in FY 2003 and is planned to be completed during FY 2005.

The AERTA database can be accessed and reviewed on the Defense Environmental Network and Information exchange (DENIX) at www.denix.osd.mil/denix/DOD/Policy/Army/Aerta. The advantage of storing information on the DENIX Web site is that access is restricted to DoD employees and contractors with approved accounts and passwords. To address problems of data management, two versions of the Army's environmental technology requirements are maintained. The first version contains unfiltered information and is maintained on the DENIX Web site. A second version, from which "sensitive" information not typically needed by the public has been deleted, is on the ESTRG Web site at xre22.brooks.af.mil/estrg/estrgtop.htm. The ESTRG site will also identify primary points of contact (one to two per program area, per service) as a gateway for interested parties outside DoD.

ACCOMPLISHMENTS AND RESULTS

This year we adopted the JCIDS process to guide the AERTA review and began the format conversion process.

LIMITATIONS

The technology teams are responsible for screening out needs for which the solutions clearly do not involve technology.

PROGRAM PARTNERS

U.S. Army Environmental Center
Members of the Army RDT&E community
Army Technology Users

PUBLICATIONS

Army Technology Needs Survey.
Army Environmental Requirements and Technology Assessments. (www.denix.osd.mil/denix/DoD/Policy/Army/Aerta).
Fiscal Year 2002 Army Environmental Requirements and Technology Assessments, Final Report. October 2002.

UNEXPLODED ORDNANCE/COUNTERMINE FORUM 2002

In a concerted effort to bring together the best minds from all corners of the world, the annual Unexploded Ordnance (UXO)/Countermine Forum 2004 will address technology, policy, and regulatory issues related to UXO and countermine. Participants will acquire a greater understanding of UXO and countermine issues, how they affect our world today, and the implications for the 21st century.

PURPOSE

To produce, manage, and host a conference that addresses countermine and UXO technology, policy, and regulatory issues.

BENEFITS

The conference brings together a diverse audience to exchange ideas and information on countermine and UXO.

DESCRIPTION

The UXO/Countermine Forum 2004 will address technology, policy and regulatory issues related to UXO.

The UXO/Countermine Forum 2004 will be sponsored by the U.S. Department of Defense Explosives Safety Board (DDESB) and hosted by the U.S. Army

Environmental Center (USAEC), in cooperation with the Office of the Project Manager for Close Combat Systems, the Unexploded Ordnance Center of Excellence, Night Vision Electronic Sensors Directorate, Communications, Electronics, Research and Development Center (CERDC), the U.S. Army Research, Development and Engineering Command, the Environmental Security Technology Certification Program, the Strategic Environmental R&D Program Office, the U.S. Army Program Manager for Non-Stockpile Chemical Materiel, the Headquarters U.S. Army Corps of Engineers R&D, the Naval Explosive Ordnance Disposal Technology Division, the U.S. Army Aberdeen Test Center, the Office of the Assistant Secretary of Defense Special Operations & Low-Intensity Conflicts (SO/LIC), Defense Threat Reduction Agency, and the National Association of Ordnance and Explosive Waste Contractors.

ACCOMPLISHMENTS AND RESULTS

USAEC produced and hosted the UXO/Countermine Forum 2002 in Orlando, Florida from 3 through 6 September 2002. Approximately 1,000 individuals attended.

FOLLOW-ON PROGRAM REQUIREMENTS

Include the five Joint UXO Coordination Office mission areas into the UXO/ Countermine Forum 2004. Plan and conduct the next UXO/Countermine Forum in St. Louis, Missouri, from 9 through 12, March 2004.

PROGRAM PARTNERS

U.S. Army Environmental Center
U.S. Department of Defense Explosives Safety Board
Office of the Project Manager for Close Combat Systems
Unexploded Ordnance Center of Excellence
Office of the Assistant Secretary of Defense Special Operations and Low- Intensity Conflicts
U.S. Army Program Manager for Non-Stockpile Chemical Materiel
Naval Explosive Ordnance Disposal Technology Division
U.S. Army Engineer Research and Development Center
National Association of Ordnance and Explosive Waste Contractors
Night Vision Electronic Sensors Directorate
Environmental Security Technology Certification Program Office
Strategic Environmental R&D Program Office
U.S. Army Aberdeen Test Center
Defense Threat Reduction Agency
Communications, Electronics, Research and Development Center

PUBLICATIONS

UXO Forum 1997, 1998, 1999, 2000, 2001, and 2002 conference proceedings.

U. S. ARMY ENVIRONMENTAL CENTER SUPPORT TO EXECUTIVE AGENT FOR THE NATIONAL DEFENSE CENTER FOR ENVIRONMENTAL EXCELLENCE

The U.S. Army Environmental Center (USAEC) is providing support to the Department of Defense Executive Agent for the National Defense Center for Environmental Excellence. The Executive Agent is the Deputy Assistant Secretary of the Army (Environment, Safety and Occupational Health). USAEC is providing Contracting Officer's Representative (COR) and Technical Working Group (TWG) support.

The COR cell is made up of a team of three people, the COR, the Alternate COR (ACOR), and one Department of Army Civilian. The COR team has three main functions. First, the COR is responsible for reviewing and approving all deliverables. Second, the COR is responsible for ensuring that all invoices are acceptable. Third, the COR team provides oversight of the contract mechanisms and technical program. This is done by working with the Program Director, and technical monitors (TM) selected from the appropriate Department of Defense organization for a given task.

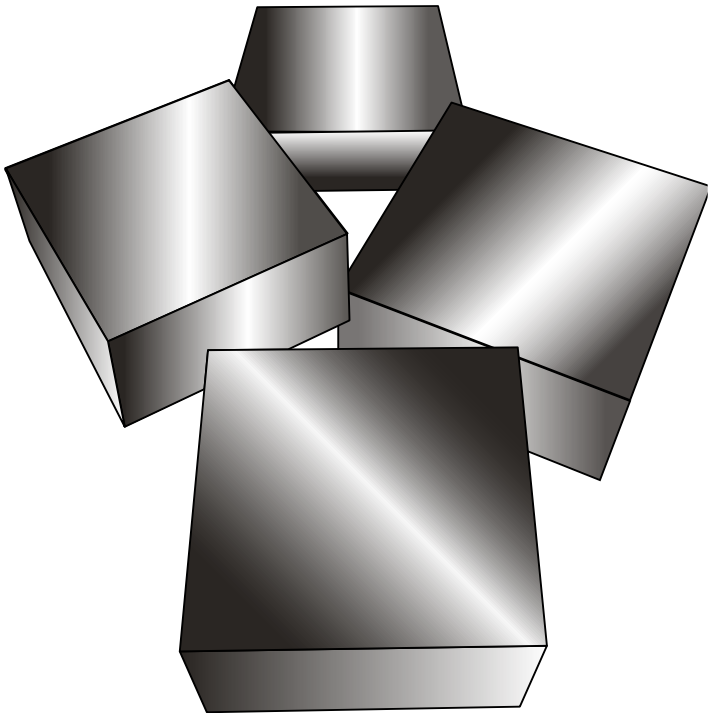
The TWG is chartered in the approved NDCEE Operating Principles. The Operating Principles provide for a three-tiered management process to assure integration among the DOD components; an Executive Advisory Board, an Executive Advisory Working Group, and the TWG. The TWG members are the high-level technical experts from each service and the Defense Logistics Agency (DLA) who are authorized to speak for the service on high priority needs that the NDCEE can address. The TWG identifies the service TMs for each NDCEE program and oversees the development of the technical effort for each congressionally directed program.

The NDCEE is working on four congressionally directed FY03 funded projects: UXO in Support of Military Readiness, Technologies to Reduce Non-Hazardous Solid Waste, Commercialization of Technologies to Lower Defense Costs, and Managing Army Technology Environmental Enhancements (MANATEE). The purpose of the first two is apparent. The third identifies technologies that will lower Department of Defense Costs and helps develop them into commercial products. The fourth is a project that uses state-of-the-art technology to provide process and environmental information to installation managers over the installations intranet. The NDCEE is working on four congressionally directed FY04 funded projects. Three are continuations of FY03 work, UXO, Solid Waste and MANATEE. The fourth is Sustainable Installations. The purpose of this task is to develop tools to help installations meet sustainability goals. The current work is being done at the Radford Army Ammunition Plant. The USAEC NDCEE team as part of their COR responsibilities is coordinating the technical level efforts across the Department of Defense.

The Army uses a portion of its NDCEE programmed funds for technical work. The FY03 funds are being used to determine the best way(s) to implement new environmentally friendly technologies in the Department of Defense. The FY04 funds are being used for three purposes: to help implement NDCEE tested technologies at a limited number of DoD sites, start the Sustainable Installation program at a couple of installations, and to look at biotechnologies that can aid in assessing the impacts of Army training on endangered species.

The NDCEE also does reimbursable technology demonstrations and validations for DoD organizations. An example from this past year is Bio-based Hydraulic Fluid Evaluation. Please contact the Technology Branch at (410) 436-5910 for additional information.

APPENDICES



ACRONYMS

AAA	**Army Audit Agency**
ACOR	**Alternate Contracting Officer's Representative**
ACSIM	**Assistant Chief of Staff for Installation Management**
AERTA	**U.S. Army Environmental Requirements and Technology Assessments**
AFM	**ATTACC for Munitions**
AO	**Administrative Order**
AR	**Army Regulation**
AR 200-2	**Environmental Effects of Army Actions**
AR 70-1	**Army Acquisition Policy**
ARDEC	**U.S. Army Armament Research, Development and Engineering Center**
ARL	**U.S. Army Research Laboratory**
ASA(ALT)	**Assistant Secretary of the Army (Acquisition, Logistics and Technology)**
ASA(I&E)	**Assistant Secretary of the Army (Installations and Environment)**
ATC	**U.S. Army Aberdeen Test Center**
ATD	**Acquisition and Technology Division**
ATSC	**Army Training Support Center**
ATTACC	**Army Training and Testing Area Carrying Capacity**
BFVS	**Bradley Fighting Vehicle Systems**
BRAC	**Base Realignment and Closure**
CAM	**Cost Analysis Manual**
CARD	**Cost Analysis Requirements Description**
CCB	**Configuration Control Board**
CEAC	**U.S. Army Cost and Economic Analysis Center**
CERDC	**Communications, Electronics, Research and Development Center**
CERL	**Construction Engineering Research Laboratory**
CFR	**Code of Federal Regulations**
CFV	**Cavalry Fighting Vehicle**
CJCSI	**Chairman of the Joint Chiefs of Staff Instruction**
COR	**Contracting Officer's Representative**
COTS	**Commercial Off-the-Shelf**
CRREL	**Cold Regions Research and Engineering Laboratory**
CX	**Categorical Exclusion**
DA	**Department of the Army**
DDESB	**Department of Defense Explosives Safety Board**
DENIX	**Defense Environmental Network and Information Exchange**
DLA	**Defense Logistics Agency**
DNT	**Dinitroluene**
DoD	**Department of Defense**
DoD 5000.2-R	**Mandatory Procedures for Major Defense Acquisition Programs and Major Automated Information System Acquisition Programs**

DoD 5000.4-M	Department of Defense Cost Analysis Guidance and Procedures
DODD	Department of Defense Directive
DOE	Department of Energy
DOPAA	Description of Proposed Action and Alternatives
DPG	Dugway Proving Ground
DTP	Detailed Test Plan
DTRA	Defense Threat Reduction Agency
EA	Environmental Assessment
ECP	Engineering Change Proposal
EHRAP	Environmental Health Risk Assessment Program
EIS	Environmental Impact Statement
EMI	Electromagnetic Induction
EO	Exploding Ordnance
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
EPA-RTP	Environmental Protection Agency - Research Triangle Park
EPAS	Environmental Performance Assessment System
EPCRA-TRI	Emergency Planning and Community Right-to-Know Act-Toxic Release Inventory
EQLCCE	Environmental Quality Life Cycle Cost Estimate
EQT	Environmental Quality Technology
ERDC	U.S. Army Corps of Engineers Engineer Research and Development Center
ESH	Environmental, Safety and Health
ESOH	Environment, Safety and Occupational Health
ESTCP	Environmental Security Technology Certification Program
ESTRG	Environmental Security Technology Requirements Group
FP	Firing Point
FRTR	Federal Remediation Technologies Roundtable
FUDS	Formerly Used Defense Sites
GC	Gas Chromatographic
GIS	Government Off-the-Shelf
GSA	General Services Administration
HE	High Explosives
HMX	Cyclotetramethylene
HTML	Hypertext Markup Language
IDS	Intrusion Detection Systems
IFV	Infantry Fighting Vehicle
IG	Inspector General
ITAM	Integrated Training Area Management
ITRC	Interstate Technology Regulatory Council
JCIDS	Joint Capabilities Integration and Development System
JPG	Jefferson Proving Ground
JUXOCO	Joint Unexploded Ordnance Coordination Office
LCAAP	Lake City Army Ammunition Plant
LCCE	Life-Cycle Cost Estimate
LEAD	Letterkenny Army Depot
MANATEE	Managing Army Technology Environmental Enhancements

MDAP	Major Defense Acquisition Programs
MMR	Massachusetts Military Reservation
NAOC	National Association of Ordnance and Explosive Waste Contractors
NATO	North Atlantic Treaty Organization
NAVEOD	U.S. Navy Explosive Ordnance Disposal
NDCEE	National Defense Center for Environmental Excellence
NEPA	National Environmental Policy Act
NESHAP	National Environmental Standards for Hazardous Air Pollutant
NQ	Nitroguanidine
NSWC	Naval Surface Warfare Center-Crane
O&M	Operation and Maintenance
OASA (ILE)	Office of the Assistant Secretary of the Army for Installations, Logistics and Environment
ODASA-CE	Office of the Deputy Assistant Secretary of the Army for Cost & Economics
ODC	Ozone Depleting Chemical
OEM	Original Equipment Manufacturer
ORNL	Oak Ridge National Laboratory
PEO	Program Executive Officer
PESHE	Programmatic Environmental, Safety and Health Evaluation
PM	Program Manager
PMO	Program Manager's Office
PVT	Production Validation Test
QC	Quality Control
QPL	Qualified Products List
R&D	Research and Development
RDA	Development and Acquisition
RDT&E	Research, Development, Test & Evaluation
RDX	Royal Demolition Explosive
REC	Record of Environmental Consideration
RFMSS	Range Facility Management Support System
SCM	Source Characterization Model
SECDEF	Secretary of Defense
SERDP	Strategic Environmental Research and Development Program
SO/LIC	Special Operations & Low-Intensity Conflicts
SP	Smoke/Pyrotechnics
SPOTA	Sustainable Painting Operations for the Total Army
STRAC	Standards in Training Commission
TM	Technical Monitors
TNS	Technology User Needs Survey
TNT	Trinitrotoluene
TRI	Technical Resources International
TSP	Total Suspended Particulate
TWG	Technical Working Group
UDLP	United Defense Limited Partnership
USACHPPM	U.S. Army Center for Health Promotion and Preventive Medicine

USAEC	**U.S. Army Environmental Center**
USAIC	**U.S. Army Infantry Center**
UXO	**Unexploded Ordnance**
VOC	**Volatile Organic Compound**
WBS	**Work Breakdown Structure**

Aerodyne Research Inc.
Army technology users
Army Training Support Center

Cedric Adams and Associates
Communications, Electronics, Research and Development Center

Defense Threat Reduction Agency
Department of Energy
Department of the Interior

Edgewood Chemical and Biological Center
Environmental Protection Agency
Environmental Quality Technology
Environmental Security Technology Certification Program
Federal Remediation Technologies Roundtable

Fort Hood, Texas
Fort Jackson, South Carolina

Headquarters, Department of the Army
Headquarters, U.S. Army Corps of Engineers Research and Development Installations
Interstate Technology Regulatory Council

Joint UXO Coordination Office

Lake City Army Ammunition Plant, Missouri
Louisiana State University-Lafayette, Corrosion Research Center

Major Army commands
Marine Corps Systems Command
Members of the Army RDT&E community

National Aeronautics and Space Administration
National Association of Ordnance and Explosive Waste Contractors
National Defense Center for Environmental Excellence
Naval Air Warfare Centers
Naval Cognizant Field Activities
Naval Explosive Ordnance Disposal Technology Division
Naval Facilities Engineering Service Center
Naval Ordnance Center, Indian Head, Maryland
Naval Research Laboratory
Naval Surface Warfare Center, Crane, Indiana
Naval Surface Warfare Center, Indian Head, Maryland
Night Vision Electronic Sensors Directorate

Oak Ridge National Laboratory
Office of the Assistant Secretary of Defense Special Operations and Low-Intensity Conflicts
Office of the Assistant Secretary of the Army Installation Management
Office of the Deputy Assistant Secretary of the Army for Cost and Economics
Office of the Director of Environmental Programs
Office of the Project Manager for Close Combat Systems
Other federal agencies

Parsons Engineering Science
Pine Bluff Arsenal
PM-Bradley A3 Upgrade
Praxis Environmental Technologies

State offices
Strategic Environmental Research and Development Program

Teledyne Solutions Incorporated

U.S. Air Force
U.S. Air Force Center for Environmental Excellence
U.S. Air Force Corrosion Prevention & Control Office
U.S. Air Force Petroleum Office
U.S. Air Force Research Laboratory
U.S. Air Force Robotics Laboratory, Tyndall AFB, Florida
U.S. Army
U.S. Army Aberdeen Test Center
U.S. Army Armament Research, Development and Engineering Center
U.S. Army Aviation and Missile Command
U.S. Army Center for Health Promotion and Preventive Medicine
U.S. Army Corps of Engineers, Engineering and Support Center, Huntsville
U.S. Army Cost and Economic Analysis Center
U.S. Army Engineer Research and Development Center
U.S. Army Engineer Research and Development Center Environmental Laboratory
U.S. Army Engineer Research and Engineering Laboratory, Cold Regions Research and
Engineering Laboratory
U.S. Army Engineer Research and Engineering Laboratory, Construction Engineering
Reseach Laboratory
U.S. Army Environmental Center
U.S. Army Europe
U.S. Army Forces Command
U.S. Army Integrated Product Teams

U.S. Army Pacific
U.S. Army Petroleum Center
U.S. Army Pollution Prevention Support Office
U.S. Army Product Manager for Non-Stockpile Chemical Materiel
U.S. Army Research Laboratory
U.S. Army Space and Missile Defense Command
U.S. Army Tank Automotive and Armament Command
U.S. Army Tank Automotive Research and Development Center
U.S. Department of Defense
U.S. Department of Defense Explosives Safety Board
U.S. Geological Survey
U.S. Marine Corps
U.S. Navy
Unexploded Ordnance Center of Excellence
United Defense Limited Partnership
West Deseret Test Center, Dugway Proving Ground